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UNIT 1
PLACE VALUE
Yukon Territory
Whitehorse
Northwest Territories
British Columbia
Alberta
Saskatchewan
Hudson Bay
Edmonton
Victoria
Manitoba
Saskatoon
Ontario
Brandon
Thunder Bay
0
200
400
km

Signposts

The numbers below represent highway distances in kilometres from Fredericton, New Brunswick.

Match them to the cities on the road signs.

1. 6674
2. 5739
3. 4598
4. 4000 + 70
5. 3000 + 400 + 40 + 7
6. 500 + 7 + 2000 + 20
7. 6 + 500 + 80
8. two hundred eighty
9. three hundred seventy-three
10. one thousand seven hundred seventy-seven

Thousands and Millions

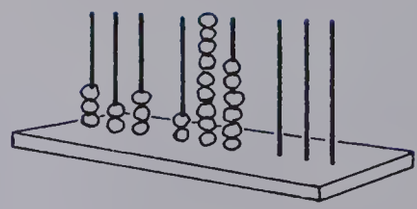
Canada's Forest Land
323 296 000 ha (hectares)

millions			thousands					
hundreds	tens	ones	hundreds	tens	ones	hundreds	tens	ones
3	2	3	2	9	6	0	0	0

Expanded form: 300 000 000 + 20 000 000 + 3 000 000 + 200 000 + 90 000 + 6000

Standard form: 323 296 000

Words: three hundred twenty-three million two hundred ninety-six thousand



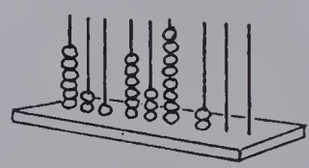
abacus

EXERCISES

Write in expanded form.

1. 7062
2. 3 075 021
3. 417 120 000

Write in standard form.

4. 600 000 + 70 000 + 3000 + 500 + 20 + 8
5. 
6. 7 000 000 + 70 000 + 4
7. 800 000 000 + 90 000 000 + 200
8. three hundred million thirty-three
9. eighty-five million six thousand seven

Write the next five whole numbers.

10. 1 000 000
11. 22 287 562
12. 5 409 389
13. 99 999
14. 99 999 999
15. 281 999

Write the place value of the 7 in each numeral.

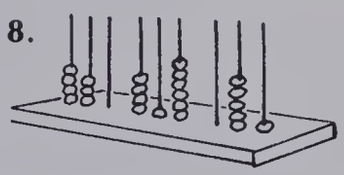
16. 703 125
17. 72 125 000
18. 709 586 214

PRACTICE

Write the place value of the underlined digit.

1. 7̲2 056
2. 6 32̲8 429
3. 4̲8 964 307
4. 50̲0 000 000
5. 7̲95 162 004
6. 202 5̲69 328

Write in standard form.

7. two million two thousand twenty-two
8. 
9. fifty-six million fifty-six
10. thirty-nine million three hundred

11. Canada's coastline is over two hundred forty-one thousand four hundred two kilometres long.
12. The Canada-United States boundary is eight thousand eight hundred ninety-two kilometres long.

Write the next four numerals in the pattern.

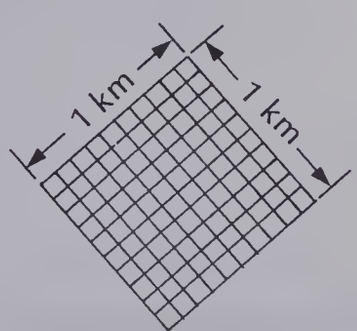
13. 116 000 000, 118 000 000, 120 000 000, ■, ■, ■, ■
14. 28 400 000, 28 600 000, 28 800 000, ■, ■, ■, ■
15. 99 850, 99 900, 99 950, ■, ■, ■, ■

Our Forests

Hectares of Forest Land					
Alta.	27 678 000	Nfld.	12 759 000	Que.	69 659 000
B.C.	54 534 000	N.S.	4 448 000	Sask.	12 829 000
Man.	13 558 000	Ont.	43 256 000	N.W.T.	23 254 000
N.B.	6 316 000	P.E.I.	251 000	Y.T.	54 754 000

Follow the pattern for **dividing by 100** to change hectares (ha) to square kilometres (km^2).

100 ha = 1 km^2



Alta. 27 678 000 ha = 276 780 km^2

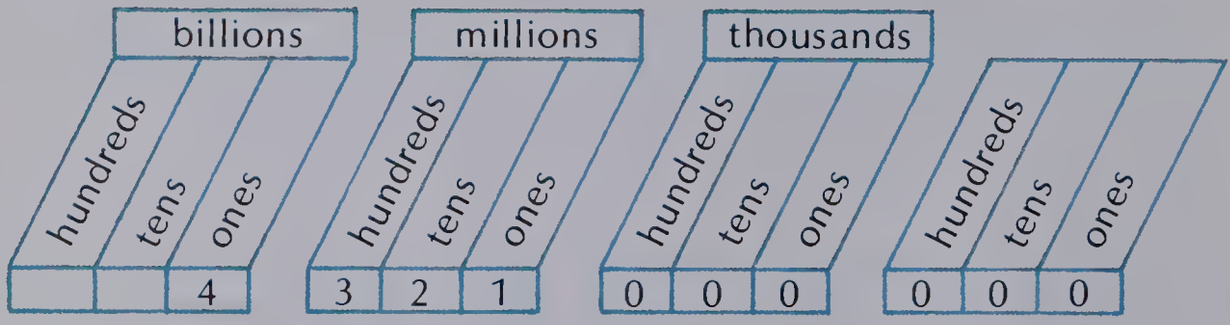
B.C. 54 534 000 ha = 545 340 km^2

Man. _____ = _____

Billions

Canada's total population:	23 597 600
North America's total population:	363 000 000
World population:	4 321 000 000

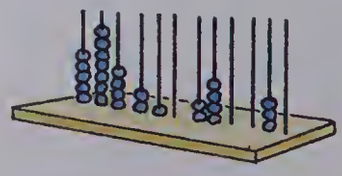
The world population is in **billions** or thousands of millions. (In some countries, a billion is a million million.)



Expanded form: 4 000 000 000 + 300 000 000 + 20 000 000 + 1 000 000
Standard form: 4 321 000 000
Words: four billion three hundred twenty-one million

EXERCISES

Write in standard form.

1. 3 000 000 + 472 000 + 134
2. 
3. 4 000 000 000 + 378 000 000 + 250
4. 75 000 000 000 + 600 000
5. 32 000 000 000 + 568
6. forty-three billion three hundred fifty-one thousand
7. five billion five million five thousand five
8. three hundred billion three hundred thousand three

Write in expanded form.

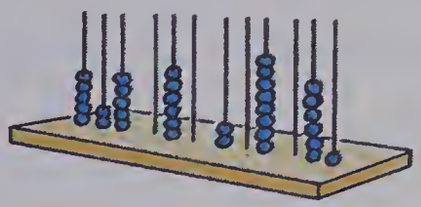
9. 5 235 387 000
10. 121 234 428 000
11. 74 345 658 571
12. 9 980 000 000

PRACTICE

Write the place value of the 4 in each numeral.

1. 3 7<u>4</u>3 625 000
2. 1<u>4</u>2 796 030 000
3. <u>4</u>73 562 000 000
4. 6<u>4</u> 109 357 000

Write in standard form.

5. 577 000 000 000 + 235 000 000
6. 
7. 878 000 000 000 + 55 000
8. 22 000 000 000 + 101 000 000 + 404
9. 999 000 000 000 + 99 000 000 + 99
10. forty-six billion three hundred million
11. seventy-five billion seventy-five thousand seventy-five
12. three hundred forty-one billion nine thousand twelve

Write the next three numerals in the pattern.

13. 41 500 000 000, 42 000 000 000, 42 500 000 000, ■, ■, ■.
14. 243 190, 245 190, 247 190, ■, ■, ■.
15. 8 175 260, 8 475 260, 8 775 260, ■, ■, ■.
16. 8 999 999 997, 8 999 999 998, 8 999 999 999, ■, ■, ■.

Multiplying Magic

Copy and complete *without* multiplying.
Use the patterns.

999 × 2 = 1998
999 × 3 = 2997
999 × 4 = 3996
999 × 5 = ■
999 × 6 = ■
999 × 7 = ■
999 × 8 = ■
999 × 9 = ■
999 × 10 = ■

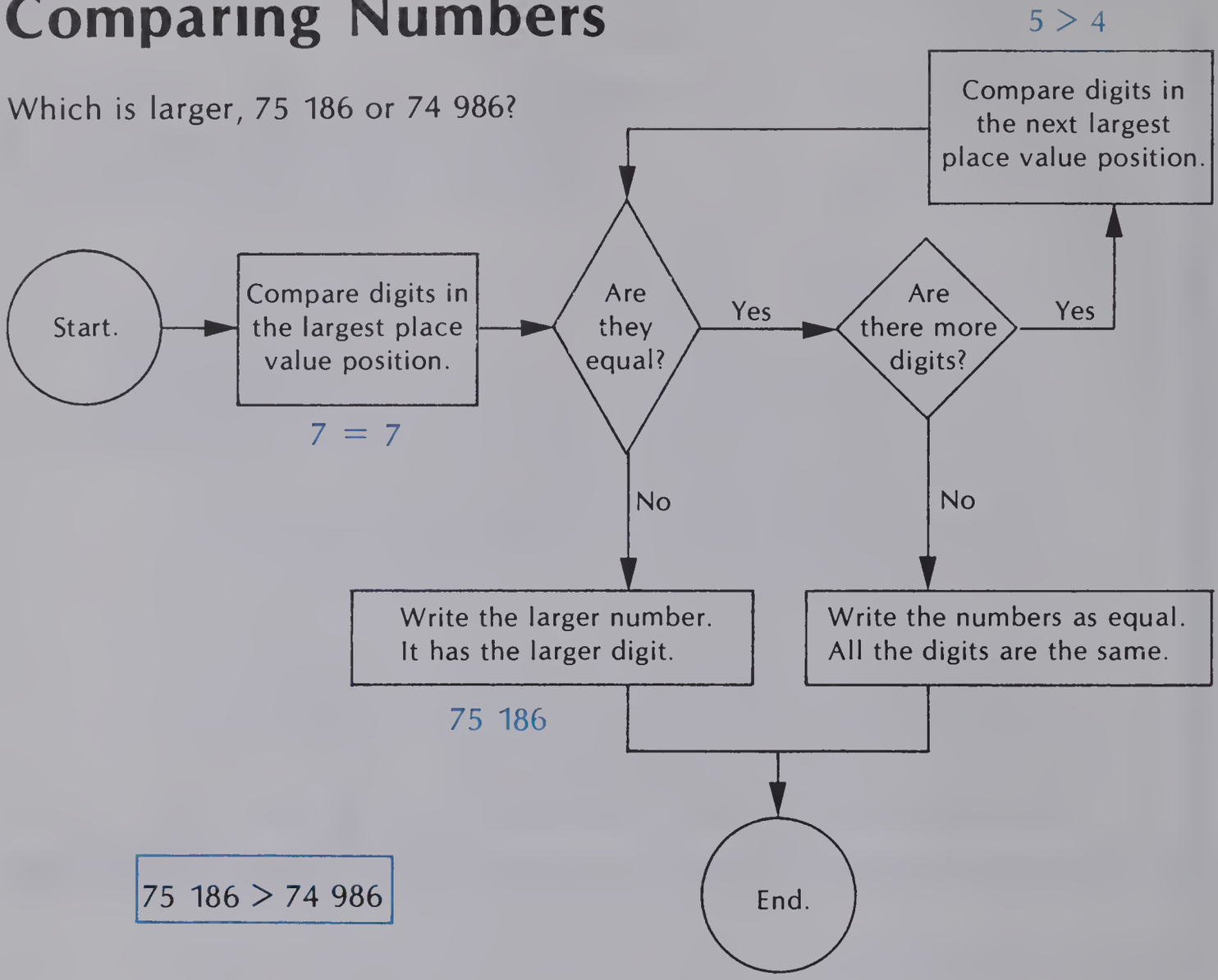
999 × 11 = 10 989
999 × 12 = 11 988
999 × 13 = ■
999 × 14 = ■
999 × 15 = ■
999 × 16 = ■
999 × 17 = ■
999 × 18 = ■
999 × 19 = ■
999 × 20 = ■

999 × 21 = ■
999 × 22 = ■
999 × 23 = ■
999 × 24 = ■
999 × 25 = ■
999 × 26 = ■
999 × 27 = ■
999 × 28 = ■
999 × 29 = ■
999 × 30 = ■

Can you go further?

Comparing Numbers

Which is larger, 75 186 or 74 986?



75 186 > 74 986

EXERCISES

Copy and complete. Use $<$, $=$, or $>$.

1. 82 195 ■ 82 195
2. 93 007 ■ 91 989
3. 581 296 ■ 581 301
4. 156 384 ■ 156 384
5. 6 158 720 ■ 6 158 721
6. 142 803 ■ 143 308
7. 89 098 211 ■ 89 089 422
8. 1 690 238 ■ 997 678
9. 444 318 956 ■ 444 318 996
10. 7 403 265 ■ 7 304 265

Write in order starting with the least.

11. 76 195, 67 195, 17 695, 71 695, 61 795
12. 8 231 052, 8 321 052, 8 123 052, 8 312 052, 8 132 052

PRACTICE

Copy and complete. Use $<$, $=$, or $>$.

1. 62 905 ■ 62 950
2. 4 058 243 ■ 4 058 234
3. 387 000 + 241 ■ 387 241
4. 1089 ■ 1089
5. 921 453 760 ■ 921 453 706
6. 60 000 + 600 + 6 ■ 60 606
7. 84 111 ■ 83 999
8. 987 321 ■ 987 123

9. Write these dates in order starting with the earliest.

1837	Upper Canada Rebellion
1608	Champlain established Quebec City.
1885	Last spike driven for the CPR coast to coast.
1812	War of 1812
1750	Fort Toronto built
1949	Newfoundland became a province.
1534	Cartier discovered the Gulf of St. Lawrence.
1000	Canada seen for the first time by Norsemen.
1759	Battle of the Plains of Abraham
1858	Gold found in the sandbars of the Fraser River.
1867	Dominion of Canada is created.

10. Make a time line showing the above events in Canada's history.

Number Search

Write 9-digit numerals. Use the digits 1 to 9 only once.

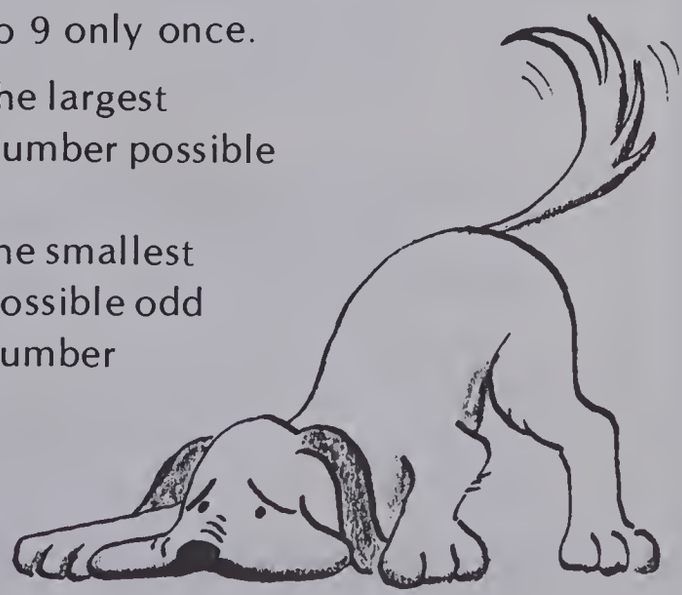
a. the smallest number possible

b. the largest number possible

c. the smallest possible even number

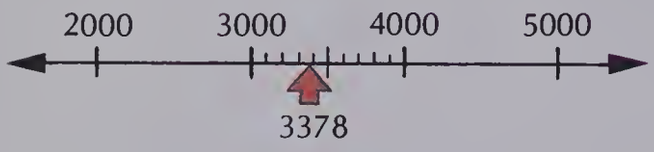
d. the smallest possible odd number

e. the tenth largest even number



Rounding Air Distances

Toronto to Vancouver: 3378 km.



3378 rounded to the nearest thousand is 3000.

Ottawa to Vancouver: 3586 km.

3586 rounded to the nearest thousand is 4000.

EXERCISES

Round to the nearest hundred.

1.	136	2.	271	3.	385	4.	450	5.	555
6.	2091	7.	6781	8.	7402	9.	59 753	10.	66 738

Round to the nearest thousand.

11.	1856	12.	3919	13.	4432	14.	2776	15.	6571
16.	62 248	17.	44 218	18.	982	19.	47 819	20.	12 553

Round to the nearest million.

21.	5 417 243	22.	3 875 792	23.	70 516 374
24.	578 476 108	25.	91 549 163	26.	369 857 113

PRACTICE

Round to the nearest hundred.

1. 752 **2.** 6831 **3.** 1075 **4.** 42 908 **5.** 99

6. the distance between Winnipeg and Edmonton

Round to the nearest thousand.

7. 4172 **8.** 3690 **9.** 5521 **10.** 9999 **11.** 48 400

12. the distance from Montreal to Vancouver

Round to the nearest ten thousand.

13. 35 416 **14.** 23 779 **15.** 155 604 **16.** 8 976 358

Round to the nearest hundred thousand.

17. 408 172 **18.** 457 190 **19.** 5 362 147 **20.** 32 169 487

Round to the nearest million.

21. 8 752 167 **22.** 6 179 598 **23.** 83 946 101 **24.** 987 412 659

REVIEW

N1

Write in standard form.

1. 300 000 + 700 + 40 **2.** 8 000 000 + 90 000 + 2

3. forty-four million three hundred six thousand

N2

Write the place value of the underlined digit.

4. 267 $\underline{1}$08 412 306 **5.** $\underline{4}$42 868 106 540

6. 18$\underline{5}$ 426 070 135 **7.** 321 1$\underline{7}$5 246 800

N3

Copy and complete. Use $<$, $=$, or $>$.

8. 7085 ■ 7093 **9.** 65 197 ■ 64 197

10. 3294 ■ 3294 **11.** 10 070 000 ■ 9 999 999

N4

12. Round 94 372 to the nearest hundred.

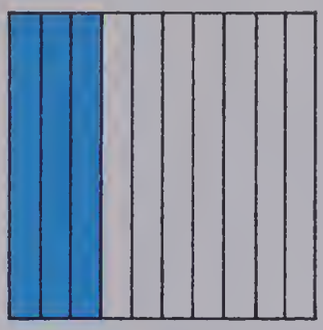
13. Round 23 387 to the nearest thousand.

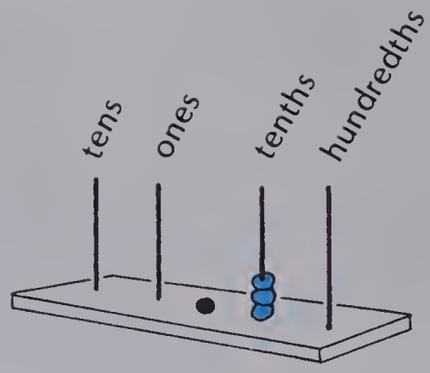
14. Round 456 409 to the nearest ten thousand.

15. Round 507 748 152 to the nearest million.

Tenths and Hundredths

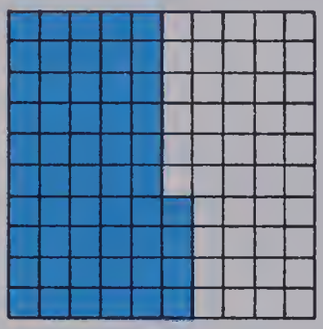
$\frac{3}{10}$

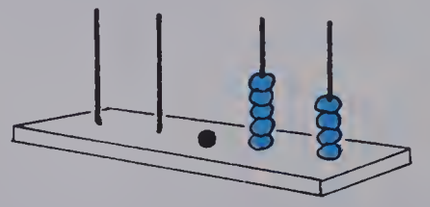




Standard form: 0.3
Words: three tenths

$\frac{54}{100}$





Standard form: 0.54
Expanded form: 0.5 + 0.04
Words: fifty-four hundredths

EXERCISES

Write as a decimal in standard form.

1. two tenths
2. twelve hundredths
3.

4. eight tenths
5. sixty-one hundredths
6. nine tenths
7. nine hundredths

8. $\frac{7}{10}$ **9.** $\frac{1}{10}$ **10.** $\frac{59}{100}$ **11.** $\frac{3}{100}$ **12.** $\frac{63}{100}$

Write in words.

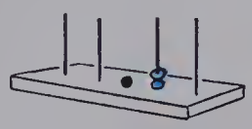
13. 0.8 **14.** 0.6 **15.** 0.1 **16.** 0.95 **17.** 0.09

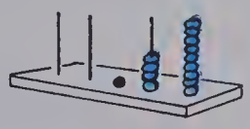
Write the decimal in expanded form.

18. 0.59 **19.** 0.68 **20.** 0.39 **21.** 0.75 **22.** 0.14

PRACTICE

Write as a decimal in standard form.

1. 

2. 

3.

4. six tenths
5. three tenths
6. eleven hundredths
7. ninety-eight hundredths
8. eighteen hundredths
9. five hundredths
10. thirty-two hundredths
11. four tenths
12. four hundredths

13. $\frac{6}{10}$
14. $\frac{6}{100}$
15. $\frac{29}{100}$
16. $\frac{8}{10}$
17. $\frac{8}{100}$

Write in words.

18. 0.4
19. 0.9
20. 0.7
21. 0.02
22. 0.16

Write the decimal in expanded form.

23. 0.35
24. 0.78
25. 0.66
26. 0.11
27. 0.94

USING THE CALCULATOR

Divide with a calculator. Do you see the pattern?

100 ÷ 100 = 1

100 cm = 1 m

a. 42 cm = ■ m
b. 19 cm = ■ m
c. 70 cm = ■ m
d. 7 cm = ■ m
e. 3 cm = ■ m
f. 2 cm = ■ m

10 ÷ 10 = 1

10 dm = 1 m

g. 8 dm = ■ m
h. 3 dm = ■ m

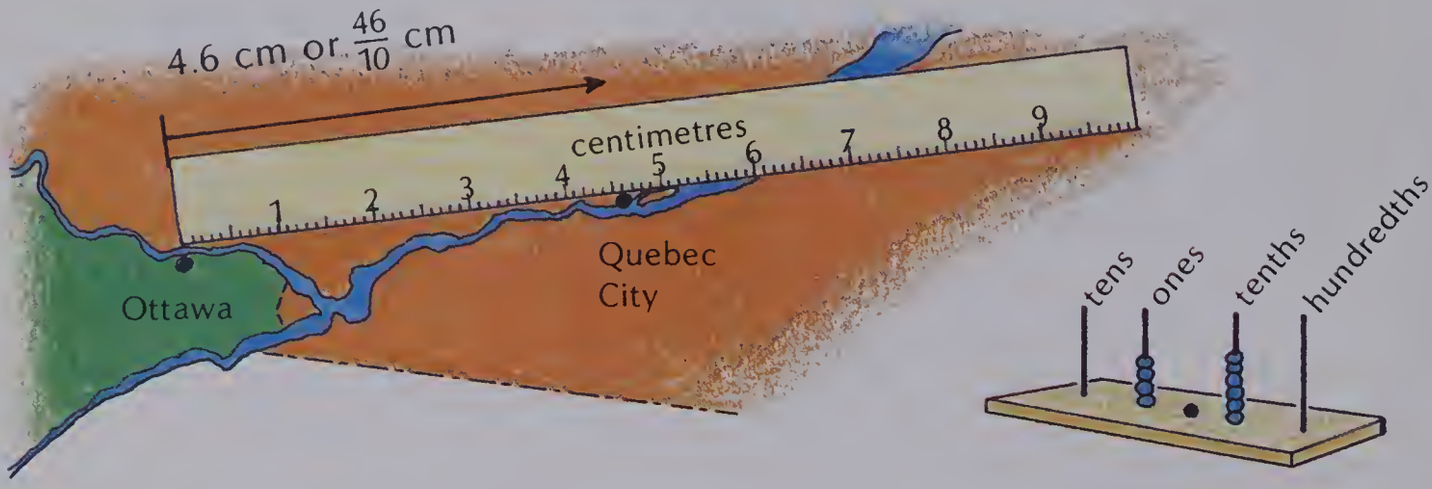
10 cm = 1 dm

i. 5 cm = ■ dm
j. 9 cm = ■ dm
k. 1 cm = ■ dm

one metre

Decimals Greater than One

What is the distance between Ottawa and Quebec City?



Scale: 1 cm = 100 km

0 100 200 300

Standard form: 4.6
Expanded form: 4 + 0.6
Words: four **and** six tenths

The distance between Ottawa and Quebec City is 460 km.

EXERCISES

Write as a decimal in standard form.

1. 5 + 0.7 **2.** 30 + 8 + 0.4 **3.** 700 + 60 + 5 + 0.9
4. 8 + 0.3 + 0.05 **5.** 9 + 0.1 + 0.01 **6.** 40 + 9 + 0.3 + 0.05
7. three **and** two tenths **8.** fifteen **and** four tenths
9. eighty **and** twelve hundredths
10. thirty-eight **and** forty-seven hundredths

Write in expanded form.

11. 7.8 **12.** 12.5 **13.** 6.17 **14.** 42.75 **15.** 376.32

Write as a decimal in standard form.

16. $\frac{23}{10}$ **17.** $\frac{35}{10}$ **18.** $\frac{71}{10}$ **19.** $\frac{429}{100}$ **20.** $\frac{335}{100}$

Write each amount using numerals, $, and •.

21. four dollars **and** twelve cents **22.** one dollar **and** one cent

PRACTICE

Write as a decimal in standard form.

1. $6 + 0.5$
2. $10 + 3 + 0.8$
3. $500 + 60 + 2 + 0.3$
4. $3 + 0.2 + 0.08$
5. $9 + 0.5 + 0.06$
6. $20 + 9 + 0.4 + 0.07$
7. sixty-eight and three tenths
8. five hundred nine and five tenths
9. two and seventy-nine hundredths
10. eight hundred fourteen and five hundredths

Write in expanded form.

11. 2.1
12. 32.9
13. 156.8
14. 3.07
15. 403.17

Write as a decimal in standard form.

16. $\frac{14}{10}$
17. $\frac{25}{10}$
18. $\frac{32}{10}$
19. $\frac{126}{100}$
20. $\frac{238}{100}$

Write each amount using numerals, \$, and •.

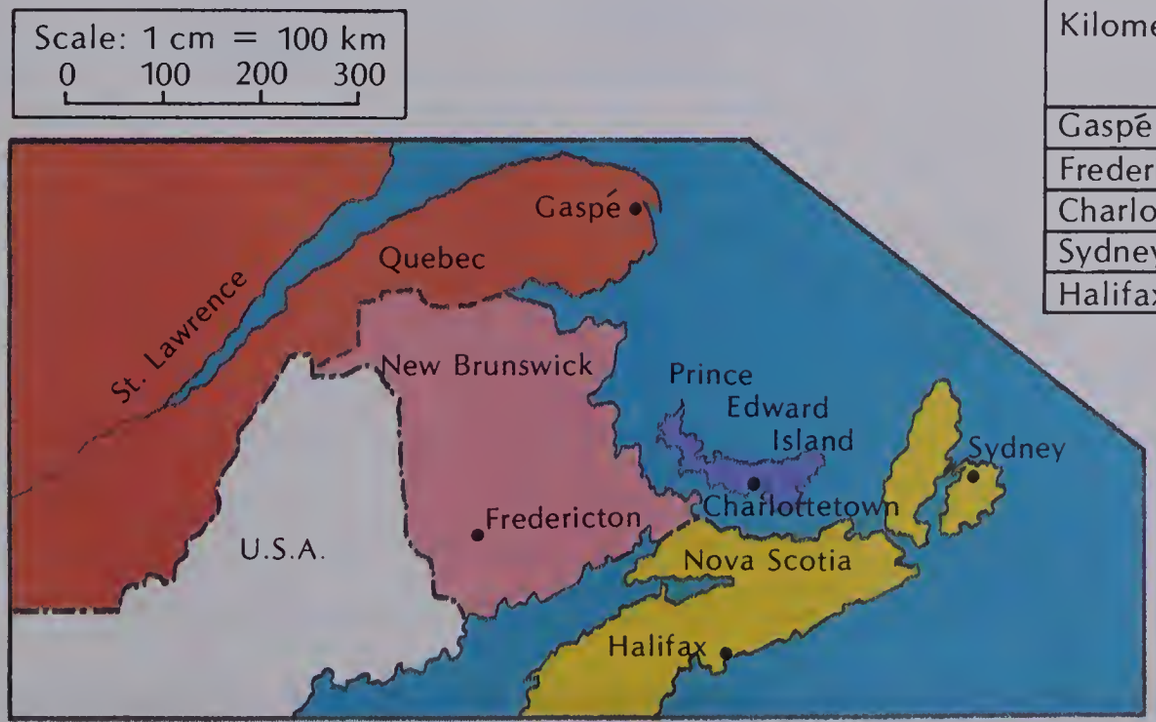
21. eleven dollars and fifty cents
22. eleven dollars and five cents

Charting the Distance

Find the distances between each pair of cities.

List the distances in a chart.

Kilometres	Gaspé	Fredericton	Charlottetown	Sydney	Halifax
Gaspé	■				
Fredericton		■			
Charlottetown			■		
Sydney				■	
Halifax					■

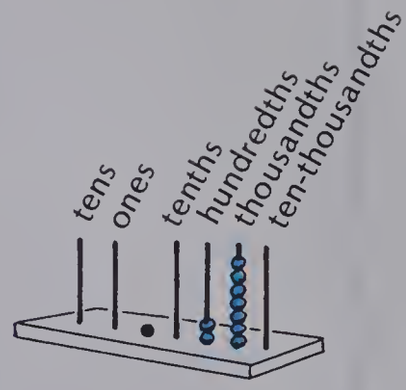


Thousandths and Ten-Thousandths

27 out of 1000

Standard form: 0.027
Expanded form: 0 + 0.02 + 0.007
Words: twenty-seven thousandths

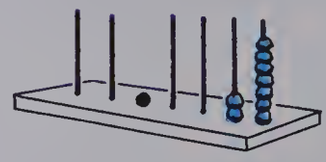
$\frac{27}{1000}$



27 out of 10 000

Standard form: 0.0027
Expanded form: 0 + 0.002 + 0.0007
Words: twenty-seven ten-thousandths

$\frac{27}{10\,000}$



EXERCISES

Write as a decimal in standard form.

1. 5 + 0.2 + 0.03 + 0.009
2. 10 + 4 + 0.3 + 0.08 + 0.002
3. 1 + 0.06 + 0.005
4. 300 + 20 + 5 + 0.6 + 0.009
5. 3 + 0.1 + 0.03 + 0.001 + 0.0004
6. 6 + 0.7 + 0.07 + 0.003 + 0.0002
7. 10 + 0.5 + 0.006 + 0.0009
8. 400 + 5 + 0.02 + 0.008 + 0.0006
9. six thousandths
10. one hundred one thousandths
11. four ten-thousandths
12. thirteen ten-thousandths
13. fifty **and** three hundred seventy-two thousandths
14. two **and** four thousand six hundred six ten-thousandths

15. $\frac{175}{1000}$
16. $\frac{648}{1000}$
17. $\frac{465}{1000}$
18. $\frac{4265}{10\,000}$
19. $\frac{9103}{10\,000}$

PRACTICE

Write the place value of the underlined digit.

1. 25.1<u>2</u>6
2. 34.<u>9</u>17
3. 6.07<u>2</u>
4. 40.175<u>9</u>

Write as a decimal in standard form.

5. 3 + 0.2 + 0.09 + 0.001
6. 40 + 5 + 0.3 + 0.08 + 0.004
7. 400 + 8 + 0.008
8. 7000 + 20 + 5 + 0.1 + 0.006
9. 0.7 + 0.08 + 0.007 + 0.0008
10. 100 + 0.2 + 0.09 + 0.007 + 0.0005
11. 900 + 8 + 0.005 + 0.0006
12. 5000 + 100 + 2 + 0.5 + 0.0004
13. four thousandths
14. twelve thousandths
15. nine ten-thousandths
16. sixteen ten-thousandths
17. thirty and four hundred two thousandths
18. six and thirty-nine ten-thousandths

19. $\frac{642}{1000}$
20. $\frac{8}{1000}$
21. $\frac{52}{1000}$
22. $\frac{1752}{10\,000}$
23. $\frac{26}{10\,000}$

Write in expanded form.

24. 5.872
25. 35.184
26. 9.4278
27. 67.0079

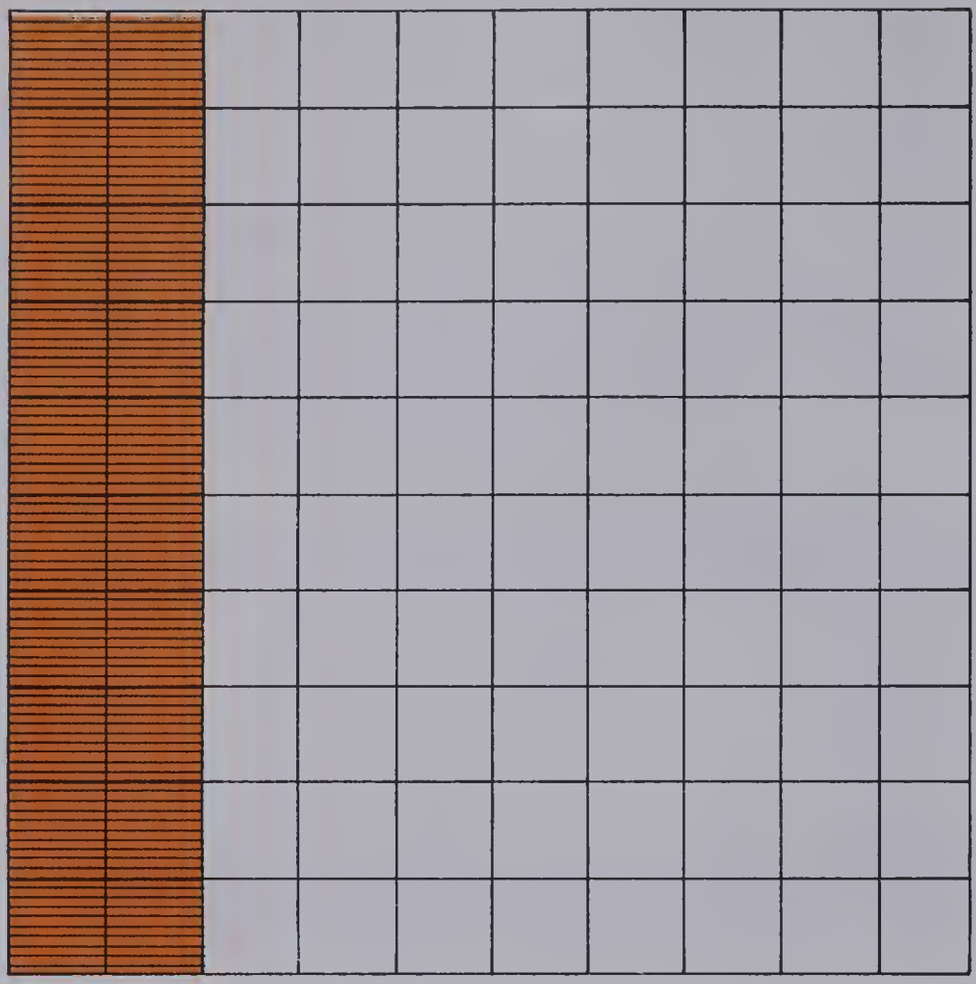
Decimal Patterns

1.0 0.1 0.01 0.001

Write the next four numerals in the pattern.

a. 0.2, 0.4, 0.6, ■, ■, ■, ■.
b. 0.20, 0.17, 0.14, ■, ■, ■, ■.
c. 0.001, 0.005, 0.009, ■, ■, ■, ■.
d. 0.0001, 0.0003, 0.0005, ■, ■, ■, ■.
e. 0.0039, 0.0033, 0.0027, ■, ■, ■, ■.
f. 62.0106, 62.0207, 62.0308, ■, ■, ■, ■.
g. 147.053, 146.043, 145.033, ■, ■, ■, ■.

Zeros in Decimals



$$\frac{2}{10} = \frac{20}{100} = \frac{200}{1000}$$

0.2 is *equivalent* to 0.20 and 0.200.

Zeros after the last digit of a decimal do not change its value.

EXERCISES

Write an equivalent decimal in tenths.

1. 0.60 = 0.■
2. 1.700 = 1.■
3. 5 = 5.■
4. 0.400 = ■■
5. 3.200 = ■■
6. 30.80 = ■■

Write an equivalent decimal in hundredths.

7. 0.4 = 0.■■
8. 3.600 = 3.■■
9. 2 = 2.■■
10. 0.030 = ■■■
11. 12 = ■■■
12. 6.1 = ■■■

Write an equivalent decimal in thousandths.

13. 3.40 = 3.■■■
14. 27.3 = 27.■■■
15. 9 = 9.■■■
16. 0.3 = ■■■■
17. 2.55 = ■■■■
18. 62 = ■■■■

Write true or false.

19. 0.9 = 0.90
20. 1.7 = 1.070
21. 83 = 83.00

PRACTICE

Copy and complete.

1. $0.01 = 0.\blacksquare\blacksquare\blacksquare$
2. $98.6 = 98.\blacksquare\blacksquare$
3. $4 = 4.\blacksquare$
4. $0.700 = 0.\blacksquare$
5. $43.20 = 43.\blacksquare$
6. $69.000 = 69.\blacksquare$
7. $2.9 = 2.\blacksquare\blacksquare\blacksquare$
8. $125.900 = 125.\blacksquare$
9. $8 = 8.\blacksquare\blacksquare$

Write an equivalent decimal in tenths.

10. 7.300
11. 6.10
12. 15
13. 11.8
14. 42.60

Write an equivalent decimal in hundredths.

15. 0.030
16. 17.2
17. 39
18. 3.040
19. 53.1

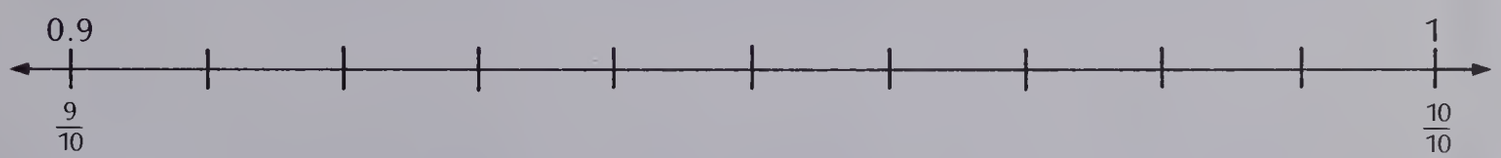
Write an equivalent decimal in thousandths.

20. 421.1
21. 15.44
22. 9
23. 4.56
24. 0.86

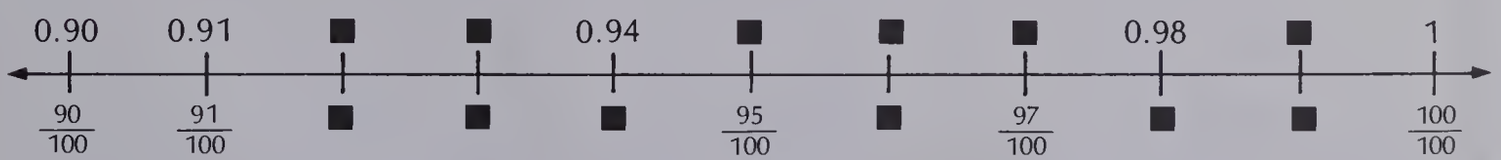
Number Line Patterns

Copy the number lines. Find the patterns. Write the missing numbers.

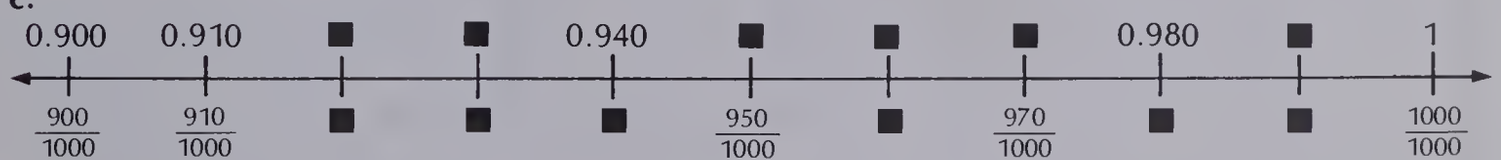
a.



b.



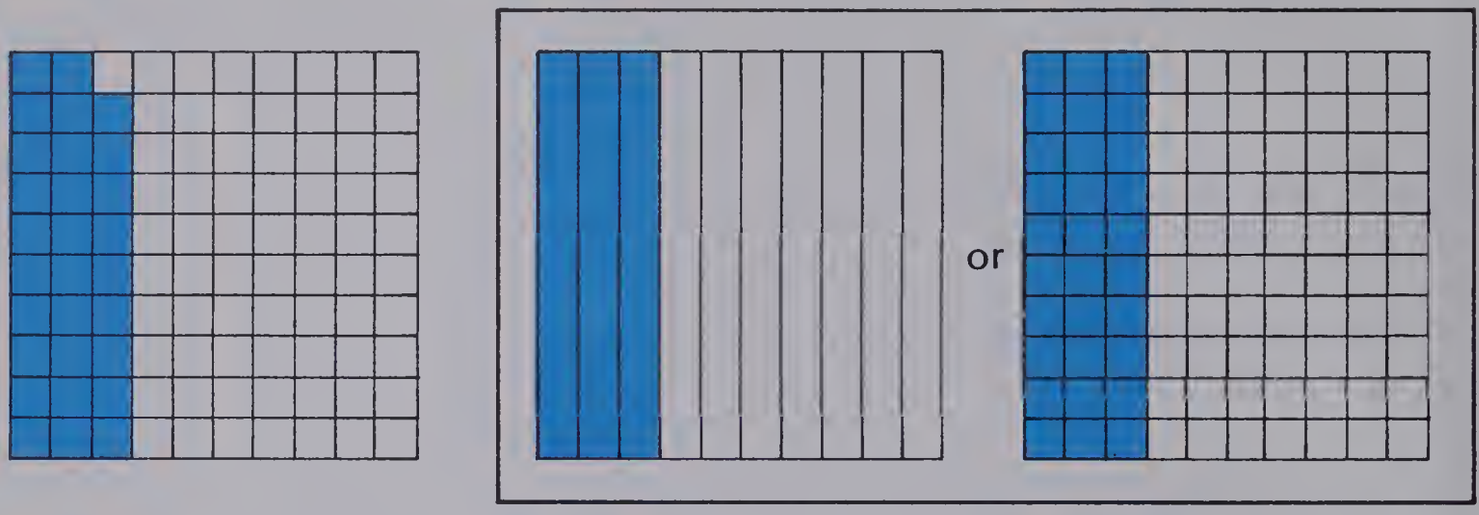
c.



d.

Comparing Decimals

Which is greater, 0.29 or 0.3?



0.29 0.3 0.30

We know: $0.29 < 0.30$

So: $0.29 < 0.3$

EXERCISES

Copy and complete. Use $<$ or $>$.

1. $2.70 > 2.58$
   $2.7 \blacksquare 2.58$
2. $4.059 < 4.060$
   $4.059 \blacksquare 4.06$
3. $5.10 > 5.09$
   $5.1 \blacksquare 5.09$
4. $17.08 < 17.10$
   $17.08 \blacksquare 17.1$
5. $0.054 > 0.040$
   $0.054 \blacksquare 0.04$
6. $7.9 < 8.0$
   $7.9 \blacksquare 8$
7. $5.24 \blacksquare 5.3$
8. $4.005 \blacksquare 4.02$
9. $2.30 \blacksquare 2.314$
10. $0.3 \blacksquare 0.28$
11. $1.449 \blacksquare 1.5$
12. $22.99 \blacksquare 23.0$
13. $42 \blacksquare 41.16$
14. $0.478 \blacksquare 1$
15. $7 \blacksquare 0.9$

Write the smallest decimal.

16. 3, 0.03, 0.3
17. 4.001, 0.41, 1.004
18. 39.4, 39.399, 39
19. 15.217, 15.271, 15.712

PRACTICE

Copy and complete. Use $<$ or $>$.

1. 4.9 ■ 4.827
2. 16.108 ■ 16.018
3. 9.8 ■ 97
4. 0.13 ■ 0.31
5. 1.0 ■ 0.1
6. 29.02 ■ 29.007
7. 5.261 ■ 5.612
8. 25.060 ■ 26.060
9. 72.6 ■ 72.56
10. 42.4 ■ 42
11. 15.4 ■ 15.399
12. 0.003 ■ 0.030

Write in order starting with the least.

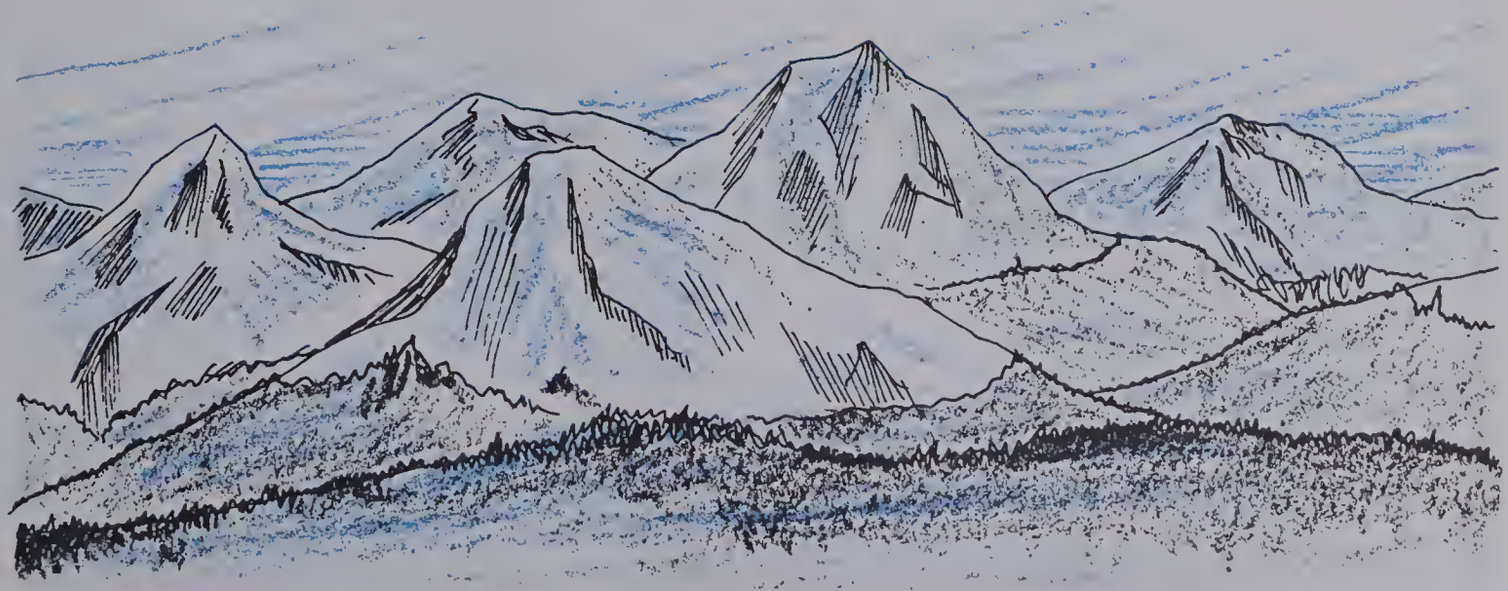
13. 0.03, 0.30, 0.003
14. 2.22, 2.02, 2.21
15. 0.11, 0.011, 0.10
16. 0.311, 0.113, 0.131
17. 1.077, 1.7, 1.777
18. 4.222, 4.202, 4.232
19. 52.1, 52.01, 51
20. 15.057, 15, 15.507

Rocky Mountain Code

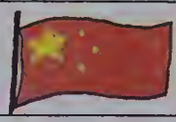
Copy and arrange the decimals in order from smallest to largest.
Read the secret message.

4.0	0.150	2.8	0.49	0.44	5	0.51	0.67
D	A	N	F	I	A	U	L

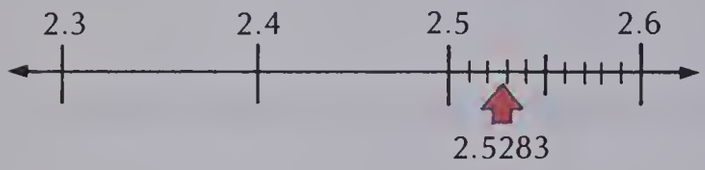
1.74	0.43	0.149	3.9	0.208	0.147	0.74
A	T	E	A	U	B	C



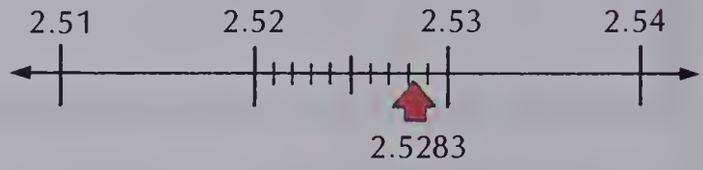
Rounding Decimals

	Canada	China 
Population	23 597 600	958 230 000
Area (km^2)	9 979 000 km^2	9 563 000 km^2
Population density per square kilometre	2.5283	455.866

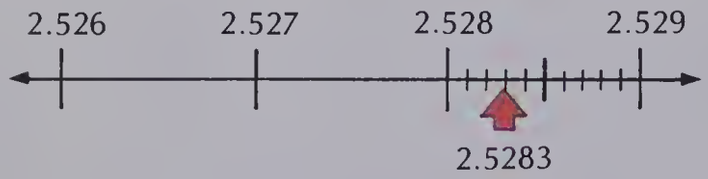
2.**5**283 rounded to the nearest tenth is 2.**5**.



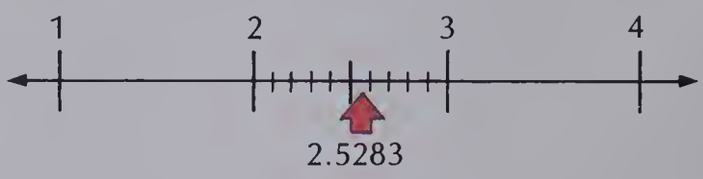
2.5**2**83 rounded to the nearest hundredth is 2.5**3**.



2.52**8**3 rounded to the nearest thousandth is 2.52**8**.



2.5283 rounded to the nearest whole number is **3**.



EXERCISES

Round to the nearest tenth.

1. 0.7**1** **2.** 3.**0**8 **3.** 0.**1**5 **4.** 3.666 **5.** 5.24

Round to the nearest hundredth.

6. 0.1**4**3 **7.** 4.1**5**8 **8.** 0.6**5**5 **9.** 6.121 **10.** 9.889

Round to the nearest thousandth.

11. 0.117**2** **12.** 1.578**9** **13.** 0.015**5** **14.** 3.4213 **15.** 2.6796

Round to the nearest whole number.

16. **8**.4 **17.** **3**.68 **18.** **12**.531 **19.** 0.286 **20.** 4.71

PRACTICE

Copy and complete the chart.

Round these numerals.	to the nearest tenth.	to the nearest hundredth.	to the nearest thousandth.	to the nearest whole number.
1. 0.9572				
2. 4.0971				
3. 3.8465				
4. 10.7059				
5. 15.1584				
6. 16.7815				

REVIEW

N5 Write as a decimal.

1. nine tenths
2. thirty-seven hundredths
3. six hundredths

N6

4. $6 + 0.5$
5. $400 + 3 + 0.5 + 0.08$
6. $90 + 0.1 + 0.02$

N7

7. $3 + 0.5 + 0.02 + 0.003 + 0.0006$
8. $10 + 2 + 0.9 + 0.005 + 0.0008$

N8 Write an equivalent decimal in hundredths.

9. 6.3
10. 15
11. 98.930
12. 26.700

N9 Copy and complete. Use $<$ or $>$.

13. 5.2 ■ 5.02
14. 36.91 ■ 36.917
15. 42 ■ 41.9

N10

16. Round 4.62 to the nearest whole number.
17. Round 306.15 to the nearest tenth.
18. Round 7.5062 to the nearest hundredth.
19. Round 35.1784 to the nearest thousandth.

Reading Charts

Country	Population	Area (km^2)	Population density per square kilometre
Canada	23 579 600	9 979 000	2.5
China	958 230 000	9 563 000	455.9
France	53 280 000	547 000	97.1
Japan	114 900 000	372 000	306.1
Russia	258 930 000	22 402 000	11.5
United States	219 484 000	9 366 000	23.1

EXERCISES

1. List the countries in order from greatest to least:
   a. according to population **b.** according to area.

2. Which country has fewer people per square kilometre than Canada?

3. Which country has the most people per square kilometre?

4. Does the United States or France have more people per square kilometre?

5. Round each "population per square kilometre" to the nearest whole number. List these densities in order from least to greatest.

UNIT 1 TEST

Write in expanded form.

1. 24 109
2. 6 251 374
3. 59 482 400

Write in standard form.

4. forty-three million sixty-two thousand
5. five billion five thousand five
6. one hundred sixty-one billion two hundred six million

Write the place value of the underlined digit.

7. 7 $\underline{3}$46 108 925
8. $\underline{6}$2 759 162 448
9. $\underline{6}$ 425 679 048
10. $\underline{9}$02 000 402 000

Copy and complete. Use $<$, $=$, or $>$.

11. 39 486 ■ 39 386
12. 999 999 ■ 8 000 000

13. Round 65 275 to the nearest thousand.
14. Round 4 098 695 to the nearest hundred thousand.
15. Round 57 314 602 to the nearest million.

Write as a decimal in standard form.

16. $0.5 + 0.09$
17. $40 + 6 + 0.2 + 0.06$
18. $3 + 0.4 + 0.05 + 0.002$
19. $0.09 + 0.008 + 0.0004$
20. five and twenty-one hundredths
21. five and seventy-five hundredths
22. eleven and four tenths

23. $\frac{7}{10}$
24. $\frac{27}{10}$
25. $\frac{16}{100}$
26. $\frac{5}{1000}$
27. $\frac{8}{10\,000}$

Copy and complete.

28. $0.4 = 0.$■■
29. $7.$■■■ $= 7.3$
30. $42.09 = 42.$■■■

Copy and complete. Use $<$ or $>$.

31. 5.04 ■ 5.4
32. 4.2 ■ 4.199
33. 28.006 ■ 28.01

34. Round 16.5731 to the nearest tenth.
35. Round 5.7431 to the nearest hundredth.
36. Round 0.8685 to the nearest thousandth.

UNIT 2
ADDITION & SUBTRACTION

Crack the Code

Replace each letter with a number to make the equation true.
Use the letters to decode the message.

■ ■ ■ ■ ■ ■   ■ ■   ■ ■ ■ ■ ■ ■

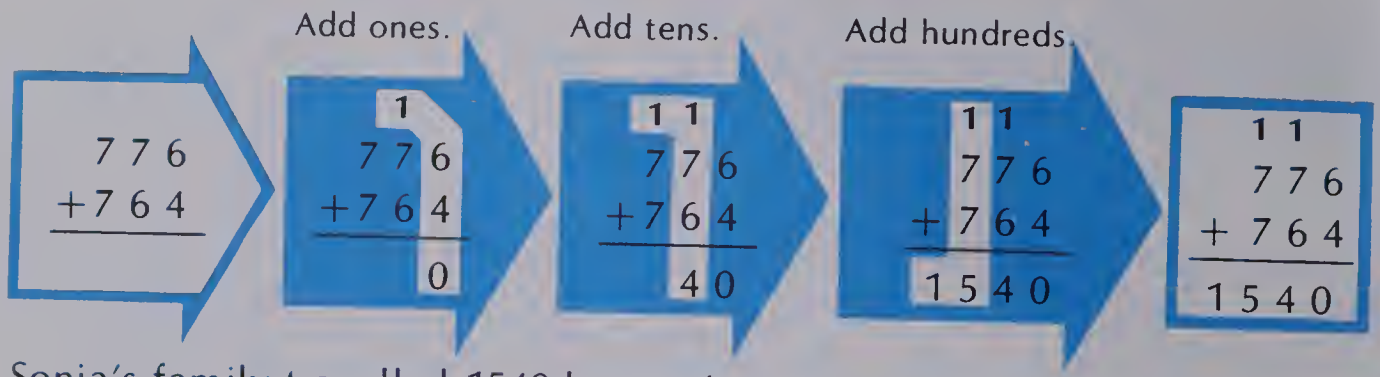
16 15 14 9 8 5   13 6   17 14 6 14 7 14

Two- and Three-Place Addition

Sonia's family drove to the Calgary Stampede on their summer holidays. On the first day, they drove 776 km from Kenora, Ontario, to Regina, Saskatchewan. On the second day, they drove 764 km from Regina to Calgary.

What was the total distance they travelled?

$776 + 764 = \blacksquare$



Sonia's family travelled 1540 km to the Calgary Stampede.

EXERCISES

Find the sum.

1. $53 + 44$
2. $635 + 19$
3. $795 + 23$
4. $856 + 64$
5. $534 + 646$
6. $381 + 175$
7. $264 + 13 + 122$
8. $35 + 132 + 463$

Find the sum.

9. $943 + 72$
10. $657 + 195$
11. $750 + 250 + 29$
12. $540 + 360 + 96$
13. $625 + 38 + 175$
14. $397 + 103 + 45$

Copy and complete each equation.

15. $24 + \blacksquare = 69 + 24$
16. $\blacksquare + 98 = 98 + 87$
17. $231 + 69 = \blacksquare + 231$
18. $564 + 918 = 918 + \blacksquare$

PRACTICE

Find the sum.

1. 76 + 43	**2.** 319 + 42	**3.** 753 + 56	**4.** 477 + 33	**5.** 39 + 982
6. 752 + 839	**7.** 979 + 868	**8.** 575 + 12 + 431	**9.** 864 + 783 + 596	**10.** 777 + 889 + 999

Find the sum.

11. 42 + 138
12. 837 + 906
13. 570 + 30 + 962
14. 12 + 188 + 35
15. 110 + 605 + 190
16. 495 + 387 + 13

Copy and complete each equation.

17. 64 + 123 = ■ + 64
18. 148 + ■ = 25 + 148

Copy and complete. Use <, =, or >.

19. 617 + 38 ● 334 + 321
20. 576 + 97 ● 217 + 468

Solve.

21. Make the largest possible 3-digit number using the digits 4, 2, and 6. Add this to the largest 3-digit number that can be made using 5, 7, and 3.

ddition Short Cut

tudy the sample problems. Find the addition short cut. Do the other roblems mentally. Write down only the answers.

196 + 157 + 4 − 4 200 + 153 = 353	308 + 176 − 8 + 8 300 + 184 = 484

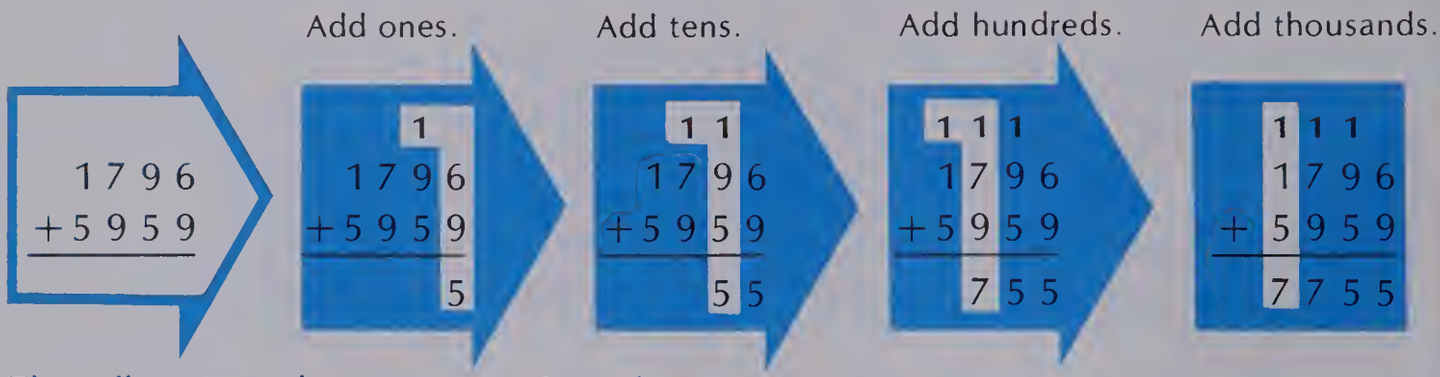
297 + 654 = ■
b. 591 + 472 = ■
675 + 341 = ■
d. 785 + 622 = ■
481 + 511 = ■
f. 497 + 435 = ■

Adding Greater Numbers

The Perrins of Winnipeg went on holiday to Zurich, Switzerland. First they flew 1796 km to Montreal. After switching planes, they flew 5959 km on to Zurich.

How far did they fly to get to Zurich?

$1796 + 5959 = \blacksquare$



They flew 7755 km to get to Zurich.

EXERCISES

Find the sum.

1. $\begin{array}{r} 1346 \\ +5722 \\ \hline \end{array}$

2. $\begin{array}{r} 7124 \\ +\ 556 \\ \hline \end{array}$

3. $\begin{array}{r} 8792 \\ +\ 261 \\ \hline \end{array}$

4. $\begin{array}{r} 6642 \\ +5193 \\ \hline \end{array}$

5. $\begin{array}{r} 79\,174 \\ +\ 6\,346 \\ \hline \end{array}$

6. $\begin{array}{r} 65\,124 \\ +86\,487 \\ \hline \end{array}$

7. $\begin{array}{r} 23\,351 \\ 4\,218 \\ +\ 224 \\ \hline \end{array}$

8. $\begin{array}{r} 572 \\ 68\,438 \\ +\ 17\,006 \\ \hline \end{array}$

Find the sum.

9. $20\,113 + 4652$
10. $86\,650 + 1937$
11. $58\,150 + 69\,950$
12. $72\,126 + 48\,388$
13. $45\,000 + 25\,000 + 145$
14. $97\,500 + 32\,500 + 486$

Copy and complete each equation.

15. $64\,125 + 3468 = \blacksquare + 64\,125$
16. $91\,125 + 68\,475 = 68\,475 + \blacksquare$
17. $\blacksquare + 79\,354 = 79\,354 + 82\,167$
18. $43\,502 + \blacksquare = 57\,782 + 43\,502$

PRACTICE

Find the sum.

1. 7968 + 8031

2. 6527 + 318

3. 9843 + 926

4. 8734 + 9091

5. 64 243 + 9 268

6. 93 424 + 67 088

7. 42 123 + 5 319 + 1 046

8. 71 238 + 12 679 + 846

Find the sum.

9. 12 394 + 7602

10. 58 655 + 1092

11. 45 620 + 37 880

12. 97 164 + 83 978

13. 41 000 + 69 000 + 356

14. 21 500 + 34 500 + 1132

Copy and complete each equation.

15. 65 986 + ■ = 38 449 + 65 986

16. 59 264 + 78 602 = ■ + 59 264

Are these sums less than 50 000? Estimate.

17. 5714 + 48 019

18. 23 525 + 25 206

Solve.

19. The air distance from Winnipeg to Zurich is 7755 km. How far did the Perrin family travel going to Zurich and then back to Winnipeg?

Casting out 9s

You can **check** addition by **casting out 9s**. Study the example below. Then add and check the other problems.

Cross out 9s.

$$\begin{array}{rcl} 2\,\cancel{9}\;\cancel{4}5\,2 & = & 4 \text{ left} \\ +\;\cancel{9}\;6\,\cancel{1}\,\cancel{2} & = & +0 \text{ left} \\ \hline \cancel{3}\,\cancel{9}\;0\,\cancel{6}\,4 & = & 4 \text{ left} \end{array}$$

a. 7295 + 623 + 8416

b. 543 + 225 + 702

c. 645 + 3376 + 2781

d. 2789 + 623 + 5584

Addition with Money

For a ski holiday, Jason travelled from his home in Thunder Bay, Ontario, to Mont Tremblant, Quebec. He spent $229.00 for air fare to Montreal, $18.35 for bus fare to the lodge, and $375.95 for food, lodging, and lift tickets.

What was the total cost of the trip?

$229.00 + $18.35 + $375.95 = ■

Keep the decimal points in a line.

$$\begin{array}{r} \$229.00 \\ 18.35 \\ +\ 375.95 \\ \hline \end{array}$$

Add.

$$\begin{array}{r} {\scriptstyle 121\ 1} \\ \$229.00 \\ 18.35 \\ +\ 375.95 \\ \hline \$623.30 \end{array}$$

The total cost of the trip was $623.30.

EXERCISES

Find the sum.

1. $\begin{array}{r} \$3.54 \\ +\ 2.35 \\ \hline \end{array}$
2. $\begin{array}{r} \$3.72 \\ +\ 6.65 \\ \hline \end{array}$
3. $\begin{array}{r} \$26.38 \\ +\ 7.91 \\ \hline \end{array}$
4. $\begin{array}{r} \$35.64 \\ +\ 68.54 \\ \hline \end{array}$
5. $\begin{array}{r} \$2.48 \\ 0.16 \\ +\ 1.32 \\ \hline \end{array}$
6. $\begin{array}{r} \$43.72 \\ 1.84 \\ +\ 70.63 \\ \hline \end{array}$
7. $\begin{array}{r} \$365.34 \\ 65.12 \\ +\ 9.30 \\ \hline \end{array}$
8. $\begin{array}{r} \$564.32 \\ 6.91 \\ +\ 713.74 \\ \hline \end{array}$

Find the sum.

9. $16.75 + $9.25
10. $397.62 + $3.48
11. $325.40 + $585.60
12. $1465.15 + $23.85
13. $15.80 + $2.10 + $6.10
14. $42.50 + $6.25 + $2.25
15. $125.30 + $475.40 + $3.30
16. $510.85 + $210.05 + $8.10

PRACTICE

Find the sum.

1. $\begin{array}{r} \$6.85 \\ +\ 3.14 \\ \hline \end{array}$

2. $\begin{array}{r} \$4.56 \\ +\ 6.72 \\ \hline \end{array}$

3. $\begin{array}{r} \$35.95 \\ +\ 7.83 \\ \hline \end{array}$

4. $\begin{array}{r} \$26.72 \\ +\ 98.76 \\ \hline \end{array}$

5. $\begin{array}{r} \$1.25 \\ 4.36 \\ +\ 2.17 \\ \hline \end{array}$

6. $\begin{array}{r} \$63.91 \\ 0.33 \\ +\ 92.75 \\ \hline \end{array}$

7. $\begin{array}{r} \$298.20 \\ 77.45 \\ +\ 3.11 \\ \hline \end{array}$

8. $\begin{array}{r} \$913.50 \\ 47.85 \\ +\ 806.31 \\ \hline \end{array}$

Find the sum.

9. $45.13 + $55.10

10. $108.46 + $2.04

11. $520.67 + $480.13

12. $1552.26 + $13.14

13. $58.70 + $4.05 + $3.25

14. $26.95 + $3.05 + $1.18

15. $650.40 + $12.20 + $12.40

16. $755.35 + $10.15 + $10.50

Copy and complete. Use $<$, $=$, or $>$.

17. $23.56 + $78.25 ● $61.48 + $40.33

18. $44.97 + $658.66 ● $314.96 + $384.86

Solve.

19. A tourist travelled from Victoria to Vancouver on a bus, a ferry, and a taxi. The bus fare was $2.50; the ferry cost $3.75; the taxi ride was $15.35. What was the total cost?

USING THE CALCULATOR

Which problems are incorrect? Use a calculator to find the correct sums.

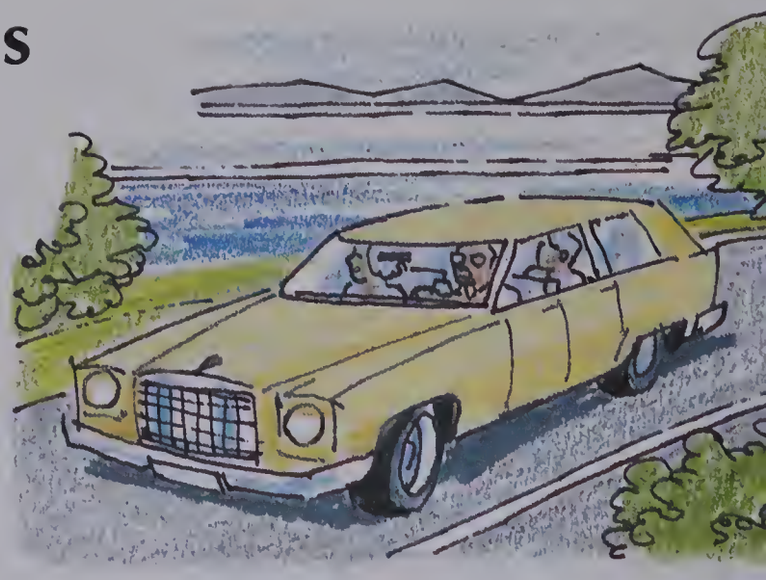
a. $\begin{array}{r} \$5\ 473.98 \\ 6\ 952.36 \\ 4\ 279.83 \\ +\ 9\ 726.38 \\ \hline \$27\ 533.55 \end{array}$

b. $\begin{array}{r} \$\ 659.39 \\ 5764.50 \\ 426.78 \\ +\ 657.95 \\ \hline \$7508.62 \end{array}$

c. $\begin{array}{r} \$\ 7.36 \\ 246.87 \\ 5987.95 \\ +\ 476.32 \\ \hline \$6950.17 \end{array}$

Addition of Decimals

On a recent driving tour of Vancouver Island, the Wallers filled their gas tank three times. At each fill-up, the tank was nearly empty. Which addition below could correctly show the total amount of gas they used?



Keep the decimal points in a line.
Add like whole numbers.

```
  111
  483
   53 . 9
+   5 . 17
  542 . 07
```

```
   11
   48 . 3
   53 . 9
+  51 . 7
  153 . 9
```

```
  11  1
  48 . 3
   5 . 39
+  0 . 517
  54 . 207
```

Which sum makes sense for 3 gas fill-ups?

EXERCISES

Find the sum.

1. 6.7 + 2.0	**2.** 6.7 + 2	**3.** 54.00 + 9.78	**4.** 54.0 + 9.78	**5.** 6.197 + 4.200
6. 6.197 + 4.2	**7.** 8.20 7.03 + 5.00	**8.** 8.2 7.03 + 5.0	**9.** 12.987 6.000 + 9.95	**10.** 12.987 6.0 + 9.95
11. 5.9 + 8.0	**12.** 7.03 + 9.4	**13.** 6.9 + 8.465	**14.** 0.567 0.9 + 0.68	**15.** 2.6 38.347 + 8.75

Find the sum.

16. 3.2 + 0.59
17. 7.26 + 13.9 + 4.177
18. 28 + 0.95
19. 4.2 + 95 + 8.85

PRACTICE

Find the sum.

1. 62.5 + 5.9	**2.** 15.73 + 9.62	**3.** 20.165 + 4.913	**4.** 8.76 + 40.91	**5.** 3.552 + 27.989
6. 5.74 + 6.8	**7.** 9.6 + 4.89	**8.** 32.6 + 5.86	**9.** 4.295 + 3.18	**10.** 5.63 + 8.473
11. 32.6 + 576.09	**12.** 5.778 + 42.5	**13.** 6.137 5.72 + 1.8	**14.** 52.6 7.953 + 8.43	**15.** 35.0 7.689 + 428.7

Find the sum.

16. 6.3 + 45.59

17. 5.147 + 8.2 + 63.49

18. 26 + 0.421

19. 0.2 + 195 + 6.88

Copy and complete each equation.

20. 8.2 + 4.6 = 8 + ■

21. 5.7 + 3.1 = 5 + ■

22. 11.4 + 9.5 = 11 + ■

23. 4.12 + 6.52 = 4 + ■

Palindromes

A **palindrome** is a number that reads the same forwards and backwards. 12 321 is a palindrome. You can make a number into a palindrome by reversing its digits and adding.

Make 763 into a palindrome.

```
  763
+ 367   Reverse digits and add.
 1130
+0311   Reverse digits and add.
 1441   A palindrome
```

Make palindromes!

a. 234

b. 514

c. 637

d. 168

More Addends

On a leisurely bicycle tour of the Nova Scotia coast, Claude rode 43 km on the first day, 35 km on the second day, 39 km on the third day, 45 km on the fourth day, and 37 km on the fifth day. How far in all did he travel on his bicycle?

Add ones.

$$\begin{array}{r} {\scriptstyle 2} \\ 43 \\ 35 \\ 39 \\ 45 \\ +\,37 \\ \hline 9 \end{array}$$

Add tens.

$$\begin{array}{r} {\scriptstyle 2} \\ 43 \\ 35 \\ 39 \\ 45 \\ +\,37 \\ \hline 199 \end{array}$$

$43 + 35 + 39 + 45 + 37 = \blacksquare$ He travelled 199 km in all.

EXERCISES

Find the sum.

1.
$$\begin{array}{r} 24 \\ 83 \\ +62 \\ \hline \end{array}$$

2.
$$\begin{array}{r} 72 \\ 98 \\ 45 \\ +35 \\ \hline \end{array}$$

3.
$$\begin{array}{r} 413 \\ 624 \\ 352 \\ +712 \\ \hline \end{array}$$

4.
$$\begin{array}{r} 46 \\ 5 \\ 3 \\ 24 \\ +62 \\ \hline \end{array}$$

5.
$$\begin{array}{r} 248 \\ 22 \\ 63 \\ 8 \\ +135 \\ \hline \end{array}$$

6.
$$\begin{array}{r} 4.3 \\ 2.1 \\ 6.5 \\ +8.2 \\ \hline \end{array}$$

7.
$$\begin{array}{r} 7.8 \\ 6.0 \\ 5.2 \\ +8.0 \\ \hline \end{array}$$

8.
$$\begin{array}{r} 5.32 \\ 2.43 \\ 1.78 \\ +4.21 \\ \hline \end{array}$$

9.
$$\begin{array}{r} 6.12 \\ 5.0 \\ 3.7 \\ 8.3 \\ +9.18 \\ \hline \end{array}$$

10.
$$\begin{array}{r} 4.62 \\ 7.2 \\ 31.0 \\ 5.4 \\ +\ 8.11 \\ \hline \end{array}$$

Find the sum.

11. $27 + 43 + 9$

12. $75 + 8 + 6 + 32$

13. $5.3 + 2.4 + 6.1 + 7.2$

14. $8.7 + 6 + 3.5 + 5$

Copy and complete.

15. $(13 + 8) + 2 = 13 + (8 + \blacksquare)$

16. $(16 + 11) + 9 = 16 + (\blacksquare + 9)$

PRACTICE

Find the sum.

1.
$$\begin{array}{r} 97 \\ 34 \\ 65 \\ +73 \\ \hline \end{array}$$

2.
$$\begin{array}{r} 6.5 \\ 3.9 \\ 4.2 \\ +7.7 \\ \hline \end{array}$$

3.
$$\begin{array}{r} 5.6 \\ 8.0 \\ 3.4 \\ +5.0 \\ \hline \end{array}$$

4.
$$\begin{array}{r} 157 \\ 28 \\ 35 \\ 9 \\ +248 \\ \hline \end{array}$$

5.
$$\begin{array}{r} 19 \\ 2.5 \\ 13 \\ 14.2 \\ +\ 6.1 \\ \hline \end{array}$$

Find the sum.

6. $163 + 4 + 29 + 75$

7. $3.5 + 6 + 12.2 + 4.8 + 9.5$

Copy and complete each equation.

8. $(6 + 8) + 2 = 6 + (\blacksquare + 2)$

9. $(13 + 91) + 9 = 13 + (91 + \blacksquare)$

10. $55 + (45 + 79) = (55 + \blacksquare) + 79$

11. $15 + (85 + 78) = (\blacksquare + 85) + 78$

Place parentheses around the easier addition first. Find the sum.

12. $75 + 25 + 89$

13. $39 + 84 + 16$

14. $49 + 51 + 75$

15. $76 + 65 + 35$

REVIEW

A1 Write vertically. Find the sum.

1. $342 + 75$

2. $958 + 713$

3. $495 + 116$

A2

4. $61\,305 + 9742$

5. $1124 + 3576 + 27\,592$

M1

6. $\$45.25 + \$16.89$

7. $\$6.39 + \$4.15 + \$12.95$

A3

8. $4.3 + 6.93$

9. $5.2 + 6.75 + 4.837$

A4

10. $9 + 48 + 216 + 4275$

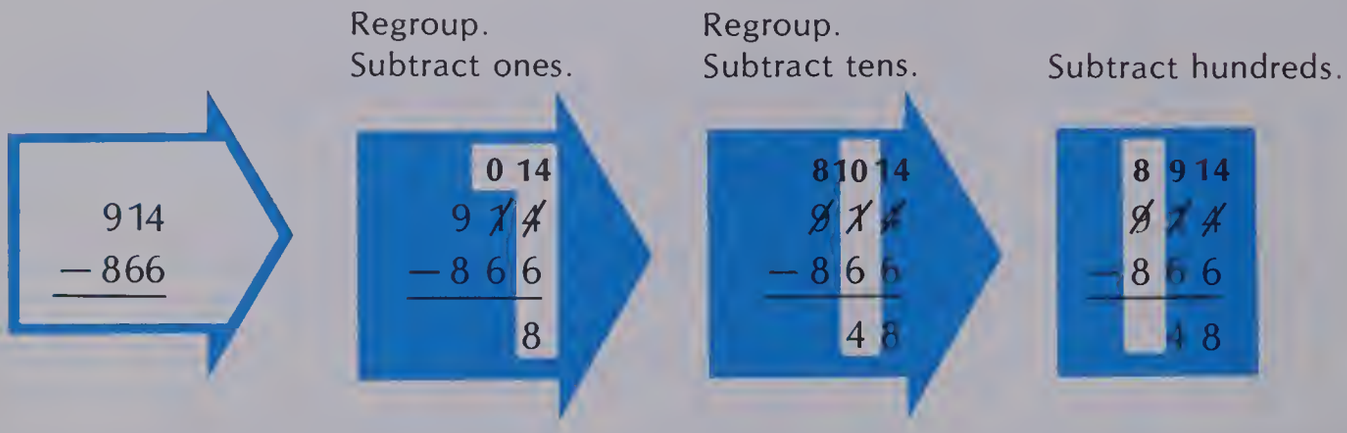
11. $8.5 + 0.9 + 62.37 + 0.174$

Two- and Three-Place Subtraction

Noelle enjoyed being at a lake on her holidays in Rouyn, Quebec. She travelled 914 km by car from Quebec City to get there. Marie stayed near the ocean on her holiday in Yarmouth, Nova Scotia. She travelled 866 km by car from Quebec City to get there.

How much farther did Noelle go on her holidays?

$914 - 866 = \blacksquare$



Noelle went 48 km farther. *Check:* 48 + 866 = 914.

EXERCISES

Find the difference.

1. 67 − 28	**2.** 467 − 128	**3.** 51 − 37	**4.** 651 − 37	**5.** 951 − 537
6. 40 − 23	**7.** 740 − 423	**8.** 80 − 57	**9.** 800 − 657	**10.** 800 − 257

11. 546 − 95 **12.** 257 − 88 **13.** 654 − 428 **14.** 502 − 245

Subtract. Check by adding.

15. 514 − 65 **16.** 321 − 186 **17.** 902 − 788 **18.** 300 − 187

PRACTICE

Find the difference.

1. 429 − 87	**2.** 574 − 38	**3.** 475 − 29	**4.** 531 − 170	**5.** 352 − 109
6. 641 − 374	**7.** 831 − 448	**8.** 905 − 166	**9.** 600 − 395	**10.** 700 − 249

11. 321 − 68 **12.** 409 − 82 **13.** 654 − 188 **14.** 227 − 166

Subtract. Check by adding.

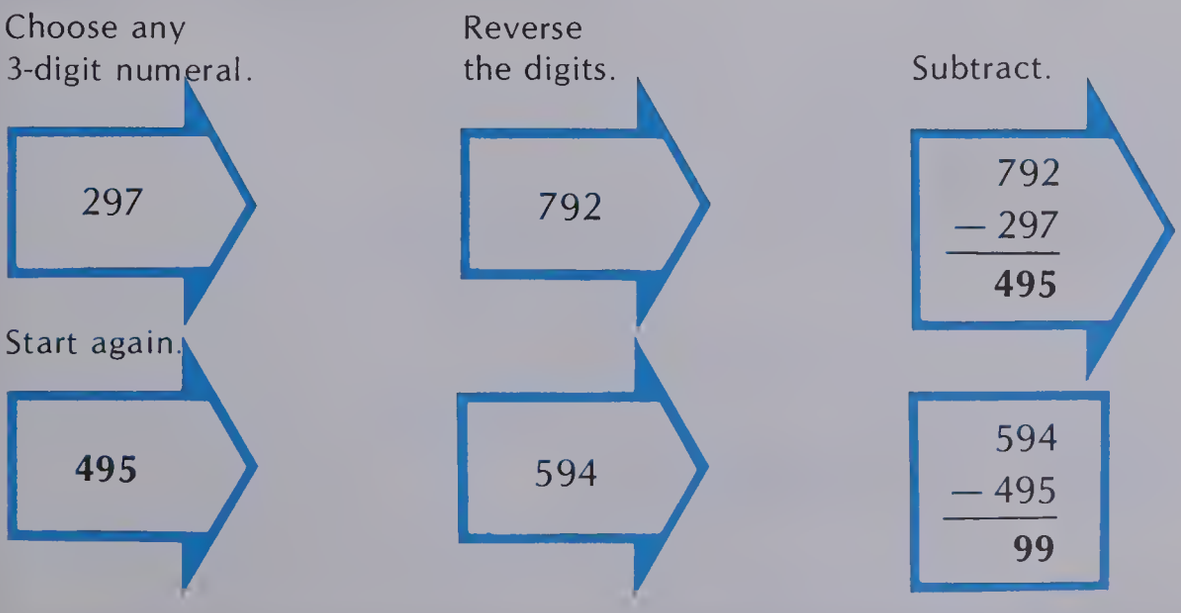
15. 573 − 96	**16.** 400 − 233	**17.** 907 − 568	**18.** 401 − 209

Solve.

19. A restaurant can seat 84 people. If 48 of these seats are for non-smokers, how many are for smokers?

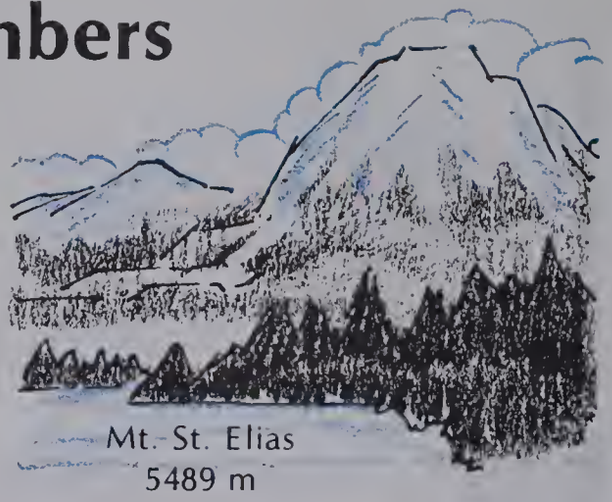
20. One evening the restaurant served 141 chicken dinners. It served 98 fewer beef dinners on the same evening. How many beef dinners were served?

Subtraction Surprises



Try other numbers. What happens?

Subtracting Greater Numbers



Ian visited Mt. St. Elias in the Yukon on his holidays. He found out that it is 5489 m high. Mt. Logan, which is Canada's highest mountain, is 6060 m high.

How much higher is Mt. Logan?

$6060 - 5489 = \blacksquare$

Regroup. Subtract ones.

$$\begin{array}{r} {\scriptstyle 5\ 10} \\ 6\,0\,\not{0}\,\not{0} \\ -\,5\,4\,8\,9 \\ \hline 1 \end{array}$$

Regroup. Subtract tens.

$$\begin{array}{r} {\scriptstyle 5\ 9\,15\,10} \\ \not{6}\,\not{0}\,\not{0}\,\not{0} \\ -\,5\,4\,8\,9 \\ \hline 7\,1 \end{array}$$

Subtract hundreds.

$$\begin{array}{r} {\scriptstyle 5\ 9\,15\,10} \\ \not{6}\,\not{0}\,\not{0}\,\not{0} \\ -\,5\,4\,8\,9 \\ \hline 5\,7\,1 \end{array}$$

Subtract thousands.

$$\begin{array}{r} {\scriptstyle 5\ 9\,15\,10} \\ \not{6}\,\not{0}\,\not{0}\,\not{0} \\ -\,5\,4\,8\,9 \\ \hline 5\,7\,1 \end{array}$$

Mt. Logan is 571 m higher. *Check:* $571 + 5489 = 6060$

EXERCISES

Find the difference.

1. $\begin{array}{r} 7152 \\ -\,3024 \\ \hline \end{array}$	**2.** $\begin{array}{r} 5843 \\ -\,1271 \\ \hline \end{array}$	**3.** $\begin{array}{r} 4037 \\ -\,3216 \\ \hline \end{array}$	**4.** $\begin{array}{r} 56\,176 \\ -\,2\,843 \\ \hline \end{array}$
5. $\begin{array}{r} 3117 \\ -\,1425 \\ \hline \end{array}$	**6.** $\begin{array}{r} 5831 \\ -\,2658 \\ \hline \end{array}$	**7.** $\begin{array}{r} 27\,314 \\ -\,5\,186 \\ \hline \end{array}$	**8.** $\begin{array}{r} 56\,253 \\ -\,45\,782 \\ \hline \end{array}$

Subtract. Check by adding.

9. $\begin{array}{r} 3674 \\ -\,968 \\ \hline \end{array}$	**10.** $\begin{array}{r} 72\,956 \\ -\,8\,388 \\ \hline \end{array}$	**11.** $\begin{array}{r} 57\,102 \\ -\,8\,435 \\ \hline \end{array}$	**12.** $\begin{array}{r} 90\,040 \\ -\,57\,617 \\ \hline \end{array}$

Round to the nearest thousand or ten thousand. Write an estimated difference.

13. $\begin{array}{r} 6180 \\ -\,3987 \\ \hline \end{array}$	**14.** $\begin{array}{r} 2117 \\ -\,1969 \\ \hline \end{array}$	**15.** $\begin{array}{r} 50\,004 \\ -\,32\,765 \\ \hline \end{array}$	**16.** $\begin{array}{r} 80\,101 \\ -\,51\,212 \\ \hline \end{array}$

PRACTICE

Find the difference.

1. 3172 − 1845	**2.** 6907 − 4899	**3.** 5315 − 2828	**4.** 60 124 − 8 033
5. 9000 − 3154	**6.** 54 003 − 22 014	**7.** 74 044 − 23 675	**8.** 57 876 − 23 478

Subtract. Check by adding.

9. 4040 − 2342	**10.** 4004 − 2342	**11.** 40 400 − 2 342	**12.** 40 004 − 2 342

Round to the nearest thousand.
Write an estimated difference.

13. 5213 − 957 **14.** 40 126 − 3995 **15.** 79 206 − 5002

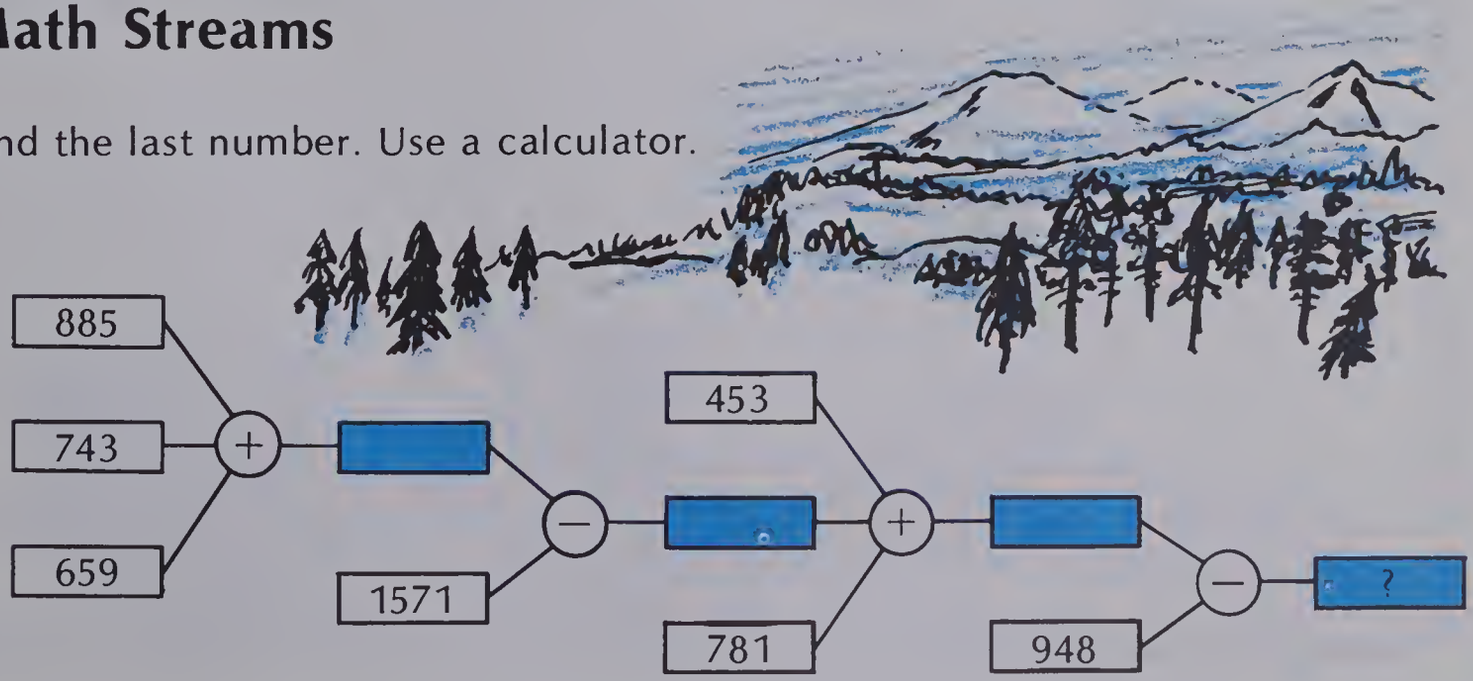
Solve.

16. Mt. Everest, the highest mountain in the world, is 8848 m high. How much higher is it than Mt. St. Elias?

17. Mt. McKinley, the highest mountain in North America, is 6194 m. What is the difference in height between Mt. McKinley and Mt. Logan?

Math Streams

Find the last number. Use a calculator.



Making Change

John bought a souvenir T-shirt when he was on holiday in Toronto. If the T-shirt cost $8.65, what was his change from a ten-dollar bill?

$$\begin{array}{r} {\scriptstyle 9\ \ 9\,10} \\ \$\cancel{1}\cancel{0}.\cancel{0}\cancel{0} \\ -\quad 8.65 \\ \hline \$\quad 1.35 \end{array}$$

The cashier gave this change:

$ 8.65

8.75 — one dime

9.00 — one quarter

10.00 — one dollar Total change = $1.35

EXERCISES

For each amount spent, find the fewest coins to give change from $1.00.

1. 97¢	**2.** 95¢	**3.** 90¢	**4.** 75¢	**5.** 86¢
6. 71¢	**7.** 39¢	**8.** 29¢	**9.** 64¢	**10.** 45¢

For each amount spent, find the change from $5.00 using the fewest coins and bills.

11. $4.00	**12.** $4.25	**13.** $3.50	**14.** $3.75	**15.** $1.25
16. $3.98	**17.** $3.47	**18.** $2.60	**19.** $1.63	**20.** 95¢

Subtract.

21. $5.00 − 2.35	**22.** $5.75 − 2.35	**23.** $7.75 − 2.89	**24.** $8.53 − 2.65	**25.** $25.50 − 9.95
26. $16.95 − 7.48	**27.** $20.00 − 18.67	**28.** $23.40 − 11.27	**29.** $18.95 − 9.23	**30.** $22.63 − 14.89

PRACTICE

Subtract.

1. $4.25 − 3.98	**2.** $6.05 − 4.35	**3.** $12.50 − 6.79	**4.** $18.10 − 12.56
5. $5.00 − 2.88	**6.** $2.00 − 0.56	**7.** $10.00 − 6.25	**8.** $20.00 − 15.99

For each amount spent, find the change from $2.00.

9. $1.25	**10.** $1.08	**11.** $0.95	**12.** 65¢
13. $1.52	**14.** $0.69	**15.** 35¢	**16.** 78¢

For each amount spent, find the change from $20.00.

17. $13.75	**18.** $19.25	**19.** $8.56	**20.** $4.39
21. $0.85	**22.** 92¢	**23.** 57¢	**24.** 5¢

John bought the following items when he was on holiday in Toronto. How much change would he receive if he paid for each with a $10.00 bill?

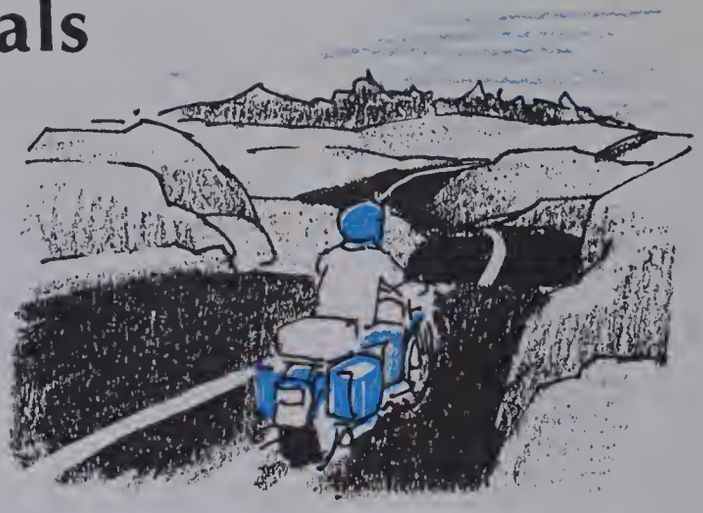
25. movie theatre ticket, $4.50
26. bus ride, 65¢
27. baseball game ticket, $8.95
28. roller skate rental, $3.75

Coin Question

Find a way to make a dollar's worth of change that uses exactly 50 coins.

Subtraction of Decimals

Mr. Reimer toured the area near Great Slave Lake on his motorcycle. On the first day he rode through rugged terrain. On the second day the ride was easier. At the end of each day he filled up his gas tank.



Which subtraction below could show how many more litres of gas he used the first day?

$$\begin{array}{r} 15.3 \\ -\ 0.99 \\ \hline \end{array}$$

$$\begin{array}{r} {\scriptstyle 1\ 4\ \ 12\ 10} \\ \cancel{15}.\cancel{3} \\ -\ 0.99 \\ \hline 14.31 \end{array}$$

$$\begin{array}{r} 15.3 \\ -\ 9.9 \\ \hline \end{array}$$

$$\begin{array}{r} {\scriptstyle 1\ 4\ \ 13} \\ \cancel{15}.\cancel{3} \\ -\ 9.9 \\ \hline 5.4 \end{array}$$

$$\begin{array}{r} 9.9 \\ -0.153 \\ \hline \end{array}$$

$$\begin{array}{r} {\scriptstyle 8\ 9\ 10} \\ 9.\cancel{9} \\ -0.153 \\ \hline 9.747 \end{array}$$

EXERCISES

Subtract.

1. $\begin{array}{r} 3.0 \\ -\ 1.9 \\ \hline \end{array}$
2. $\begin{array}{r} 3.1 \\ -\ 1.9 \\ \hline \end{array}$
3. $\begin{array}{r} 5.70 \\ -\ 2.63 \\ \hline \end{array}$
4. $\begin{array}{r} 5.7 \\ -\ 2.63 \\ \hline \end{array}$
5. $\begin{array}{r} 4.20 \\ -\ 1.75 \\ \hline \end{array}$
6. $\begin{array}{r} 4.2 \\ -\ 1.73 \\ \hline \end{array}$
7. $\begin{array}{r} 2.600 \\ -\ 1.895 \\ \hline \end{array}$
8. $\begin{array}{r} 2.6 \\ -\ 1.899 \\ \hline \end{array}$

Subtract. Check by adding.

9. $\begin{array}{r} 7.6 \\ -\ 2.7 \\ \hline \end{array}$
10. $\begin{array}{r} 5.0 \\ -\ 3.18 \\ \hline \end{array}$
11. $\begin{array}{r} 12.3 \\ -\ 9.176 \\ \hline \end{array}$
12. $\begin{array}{r} 0.3 \\ -\ 0.018 \\ \hline \end{array}$

PRACTICE

Find the difference.

1. $6.5 - 3.8$ **2.** $4.11 - 2.5$ **3.** $6.5 - 5.18$ **4.** $8.9 - 1.931$

5. $0.045 - 0.019$ **6.** $7.3 - 4.126$ **7.** $0.5 - 0.113$ **8.** $46.0 - 0.737$

Subtract. Check by adding.

9. $5.7 - 1.99$ **10.** $8.0 - 0.432$ **11.** $0.9 - 0.063$ **12.** $0.072 - 0.0019$

Copy and complete. Choose $>$, $=$, or $<$.

13. $8.4 + 9.2 \bullet 25 - 7.09$ **14.** $6.7 + 5.39 \bullet 19.67 - 7.58$

15. $43.1 - 0.017 \bullet 32.59 + 11.01$ **16.** $56.9 - 23.45 \bullet 26.115 + 7.33$

Solve.

17. How much greater is 0.6 than 0.17?

18. What is the difference between 7.9 and 7.886?

19. How much less is 1.43 than 2?

20. Is 4.33 closer to 6.42 or 2.67?

A New Sign

$=$ means the two sides of the equation are **equal**.

$\neq$ means the two sides of the equation are **not equal**.

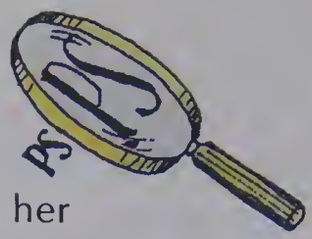
Copy and complete. Use $=$ or $\neq$.

a. $(27 + 16) + 8 \bullet 27 + (16 + 8)$ **b.** $(27 - 16) - 8 \bullet 27 - (16 - 8)$

c. $(35 - 12) - 4 \bullet 35 - (12 - 4)$ **d.** $(95 + 23) + 18 \bullet 95 + (23 + 18)$

e. $(7.2 + 1.5) + 3 \bullet 7.2 + (1.5 + 3)$ **f.** $(9 - 4.01) - 1.5 \bullet 9 - (4.01 - 1.5)$

Problem Solving



When she was on holidays, Paula bought a souvenir mug for her grandmother and a book for her sister. She spent $7.45.
What was her change from a $10 bill?

$7.45 → money spent

$10.00 → money she had

Subtract.

$$\begin{array}{r} {}^{9}\cancel{1}{}^{9}\cancel{0}{}^{10}.\cancel{0}\cancel{0} \\ -\ 7.45 \\ \hline \$\ 2.55 \end{array}$$

She received $2.55 change.

EXERCISES

Which operation should you use?

1. If it costs $48 a day for a room in a hotel and $25 a day for meals there, what is the cost per day to stay at the hotel?

2. How much more expensive is a travel tour package that costs $679.36 than one that costs $582.87?

3. How much time would you save by taking a 6 h flight rather than taking an 8.5 h flight having 2 stopovers?

4. The time in Vancouver is 3 h behind the time in Toronto. What time is it in Toronto when it is 6 o'clock in Vancouver?

5. How long a vacation is needed to spend 4 days travelling, 5 days relaxing, and 2 days shopping?

PRACTICE

Solve.

1. During their vacation, Simira's family spent $785.75 for hotel rooms and $398.64 for food. How much more did they spend for hotel rooms?

2. The time in London, England, is 7 h ahead of the time in Winnipeg. What time is it in Winnipeg when it is noon in London?

3. Melanie and Keith climbed a 5689 m high mountain starting from a village that had an elevation of 2764 m. How high did they climb?

4. Scott and Sandra started their vacation on July 15th and came back on September 5th. How long was their vacation?

5. During their vacation, Ander's parents spent $568.43 for hotel rooms, $327.65 for food, and $359.52 for gas. What was the cost of their vacation?

REVIEW

A5 Subtract.

1.	2.	3.	4.
325 − 88	940 − 56	500 − 372	101 − 29

A6

5.	6.	7.	8.
3145 − 288	5673 − 4189	40 012 − 9 531	51 009 − 23 716

M2 For each amount spent, subtract to find the change from $30.00.

9.	10.	11.	12.
$6.95	$12.50	$26.99	89¢

A7 Subtract. Check by adding.

13.	14.	15.	16.
3.2 − 1.78	5.31 − 0.499	27.0 − 1.56	2.0 − 0.018

TEST UNIT 2

Find the sum.

1. 345 + 62

2. 647 + 938

3. 264 + 359

4. 317 + 25 + 811

5. 2613 + 891

6. 20 516 + 7 824

7. 53 172 + 81 568

8. 50 183 + 29 + 5 164

9. \$5.18 + 0.95

10. \$48.37 + 51.29

11. \$40.32 + 6.52 + 12.75

12. \$19.63 + 6.75 + 25.62

13. 3.75 + 5.2

14. 49.7 + 6.845

15. 2.3 + 15.49 + 8.635

16. 0.74 + 0.2 + 0.965

17. 82 + 6 + 49 + 157

18. 5.3 + 28 + 6.25 + 4.126 + 6

Find the difference.

19. 516 − 77

20. 302 − 195

21. 7013 − 569

22. 6412 − 3795

23. 40 101 − 8 973

24. 60 002 − 52 117

25. \$6.45 − 1.99

26. \$50.00 − 27.25

Subtract. Check by adding.

27. 5.1 − 3.9

28. 6.4 − 0.17

29. 26.0 − 0.423

30. 5.0 − 0.19

Solve.

31. A travel agency sold \$8765 worth of air tickets in October and \$7995 worth in September. By how much did sales increase in October?

LOOKING BACK

PLACE VALUE

Write in expanded form.

1. 36 524
2. 7 543 245
3. 62 114 209

Write in standard form.

4. three million one hundred twelve thousand
5. nine billion nine hundred sixty-five million
6. three hundred forty-eight billion

Write the place value of the underlined digit.

7. 3 $\underline{7}$42 165 909
8. $\underline{9}$9 488 625 173
9. $\underline{8}$ 547 581 307
10. $\underline{5}$48 329 116 702

Copy and complete. Use $<$, $=$, or $>$.

11. 56 194 ● 56 281
12. 9 999 999 ● 10 000 001

13. Round 38 134 to the nearest thousand.
14. Round 5 185 602 to the nearest hundred thousand.
15. Round 57 314 685 to the nearest million.

Write as a decimal in standard form.

16. $0.7 + 0.08$
17. $30 + 9 + 0.1 + 0.04$
18. $6 + 0.5 + 0.09 + 0.008$
19. $0.05 + 0.009 + 0.0008$
20. three and forty-eight hundredths
21. five and seventy-five thousandths
22. eleven and four ten-thousandths

23. $\frac{5}{10}$
24. $\frac{31}{10}$
25. $\frac{23}{100}$
26. $\frac{6}{1000}$
27. $\frac{4}{10\,000}$

Copy and complete.

28. $0.2 = 0.\blacksquare\blacksquare$
29. $4.3 = 4.\blacksquare\blacksquare\blacksquare$
30. $58.\blacksquare\blacksquare\blacksquare = 58.21$

Copy and complete. Use $<$ or $>$.

31. 3.7 ● 3.07
32. 6.5 ● 6.499
33. 5.01 ● 5.009

34. Round 1.5756 to the nearest tenth.
35. Round 4.8097 to the nearest hundredth.
36. Round 7.3434 to the nearest thousandth.

UNIT 3
MULTIPLICATION

Products of Praise

Decode the secret message by matching the letters with the products below.

One-Digit Multipliers

Chairs are on sale for \$189. How much would it cost to buy 3?

Cost of 1 chair = \$189
Cost of 3 chairs = \$189 × 3
= \$(100 + 80 + 9) × 3

Multiply
3 × 9 ones.

$$\begin{array}{r} {\scriptstyle 2} \\ 189 \\ \times\ \ 3 \\ \hline 7 \end{array}$$

Multiply
3 × 8 tens.

$$\begin{array}{r} {\scriptstyle 2\ 2} \\ 189 \\ \times\ \ 3 \\ \hline 67 \end{array}$$

Multiply
3 × 1 hundred.

$$\begin{array}{r} {\scriptstyle 2\ 2} \\ 189 \\ \times\ \ 3 \\ \hline 567 \end{array}$$

$$\begin{array}{r} {\scriptstyle 2\ 2} \\ 189 \\ \times\ \ 3 \\ \hline 567 \end{array}$$

Three chairs would cost \$567.

EXERCISES

Find the product.

1. $\begin{array}{r} 5 \\ \times 3 \\ \hline \end{array}$	**2.** $\begin{array}{r} 40 \\ \times\ 3 \\ \hline \end{array}$	**3.** $\begin{array}{r} 700 \\ \times\ 3 \\ \hline \end{array}$	**4.** $\begin{array}{r} 745 \\ \times\ 3 \\ \hline \end{array}$
5. $\begin{array}{r} 9 \\ \times 8 \\ \hline \end{array}$	**6.** $\begin{array}{r} 70 \\ \times\ 8 \\ \hline \end{array}$	**7.** $\begin{array}{r} 600 \\ \times\ 8 \\ \hline \end{array}$	**8.** $\begin{array}{r} 679 \\ \times\ 8 \\ \hline \end{array}$
9. $\begin{array}{r} 26 \\ \times\ 4 \\ \hline \end{array}$	**10.** $\begin{array}{r} 37 \\ \times\ 5 \\ \hline \end{array}$	**11.** $\begin{array}{r} 693 \\ \times\ 6 \\ \hline \end{array}$	**12.** $\begin{array}{r} 588 \\ \times\ 3 \\ \hline \end{array}$
13. $\begin{array}{r} 706 \\ \times\ 9 \\ \hline \end{array}$	**14.** $\begin{array}{r} 508 \\ \times\ 6 \\ \hline \end{array}$	**15.** $\begin{array}{r} 7123 \\ \times\ 5 \\ \hline \end{array}$	**16.** $\begin{array}{r} 6041 \\ \times\ 7 \\ \hline \end{array}$

Copy and complete.

17. $6 \times 28 = \blacksquare \times 6$

18. $4172 \times 3 = 3 \times \blacksquare$

19. $(7 \times 6) \times 2 = 7 \times (6 \times \blacksquare)$

20. $5 \times (8 \times 3) = (5 \times \blacksquare) \times 3$

PRACTICE

Find the product.

1. 24×2	**2.** 37×3	**3.** 58×9	**4.** 631×3	**5.** 517×4
6. 658×5	**7.** 926×8	**8.** 304×2	**9.** 709×6	**10.** 408×7
11. 6143×2	**12.** 9542×3	**13.** 8614×5	**14.** 7095×8	**15.** 6004×9

Copy and complete.

16. $9 \times 358 = \blacksquare \times 9$

17. $\blacksquare \times 4 = 4 \times 5716$

18. $(8 \times 3) \times \blacksquare = 8 \times (3 \times 5)$

19. $(7 \times 6) \times 5 = 7 \times (\blacksquare \times 5)$

Solve.

20. The Boy Scouts bought 5 packages of garbage bags for a litter drive. Each package contained 75 bags. How many bags in all?

21. Ms. Panico bought 3 rolls of wire fencing. Each roll is 2 m high and 35 m long. What is the maximum length that she could fence?

Sum of Products

Copy and complete each equation.
Write your answers in order, starting with the least.

a. $(5 \times 1000) + (4 \times 100) + (7 \times 10) + (2 \times 1) = \blacksquare$

b. $(5 \times 100\,000) + (4 \times 1000) + (7 \times 100) + (2 \times 10) = \blacksquare$

c. $(5 \times 10\,000) + (4 \times 1000) + (7 \times 100) + (2 \times 1) = \blacksquare$

d. $(5 \times 1\,000\,000) + (4 \times 10\,000) + (7 \times 1000) + (2 \times 10) = \blacksquare$

Two-Digit Multipliers

At a pre-season special sale, 35 pairs of skis were sold at $205 a pair. How much money did the ski department receive in all for the skis?

$205 \times 35 = \blacksquare$

$205 \times (30 + 5) = \blacksquare$

Multiply
5 ones × 205.

$$\begin{array}{r} {\scriptstyle 2} \\ 205 \\ \times\ 35 \\ \hline 1025 \end{array}$$

Multiply
3 tens × 205.

$$\begin{array}{r} {\scriptstyle 1} \\ 205 \\ \times\ 35 \\ \hline 1025 \\ 6150 \end{array}$$

Add.

$$\begin{array}{r} 205 \\ \times\ 35 \\ \hline 1025 \\ 6150 \\ \hline 7175 \end{array}$$

$$\begin{array}{r} 205 \\ \times\ 35 \\ \hline 1025 \\ 6150 \\ \hline 7175 \end{array}$$

The ski department received $7175 in all.

EXERCISES

Find the product.

1. $\begin{array}{r} 24 \\ \times\ 2 \\ \hline \end{array}$	**2.** $\begin{array}{r} 24 \\ \times 10 \\ \hline \end{array}$	**3.** $\begin{array}{r} 24 \\ \times 12 \\ \hline \end{array}$	**4.** $\begin{array}{r} 38 \\ \times\ 7 \\ \hline \end{array}$	**5.** $\begin{array}{r} 38 \\ \times 90 \\ \hline \end{array}$
6. $\begin{array}{r} 38 \\ \times 97 \\ \hline \end{array}$	**7.** $\begin{array}{r} 56 \\ \times\ 5 \\ \hline \end{array}$	**8.** $\begin{array}{r} 56 \\ \times 70 \\ \hline \end{array}$	**9.** $\begin{array}{r} 56 \\ \times 75 \\ \hline \end{array}$	**10.** $\begin{array}{r} 256 \\ \times\ 75 \\ \hline \end{array}$
11. $\begin{array}{r} 43 \\ \times 25 \\ \hline \end{array}$	**12.** $\begin{array}{r} 97 \\ \times 68 \\ \hline \end{array}$	**13.** $\begin{array}{r} 343 \\ \times\ 21 \\ \hline \end{array}$	**14.** $\begin{array}{r} 702 \\ \times\ 43 \\ \hline \end{array}$	**15.** $\begin{array}{r} 655 \\ \times\ 79 \\ \hline \end{array}$

Copy and complete.

16. $95 \times 56 = 56 \times \blacksquare$

17. $\blacksquare \times 83 = 83 \times 416$

18. $(63 \times \blacksquare) \times 25 = 63 \times (2 \times 25)$

19. $(8 \times 50) \times 33 = 8 \times (50 \times \blacksquare)$

PRACTICE

Find the product.

1. 13 × 12	**2.** 41 × 14	**3.** 72 × 15	**4.** 68 × 27	**5.** 45 × 66
6. 39 × 28	**7.** 64 × 97	**8.** 88 × 49	**9.** 36 × 78	**10.** 47 × 47
11. 213 × 13	**12.** 402 × 28	**13.** 576 × 45	**14.** 809 × 27	**15.** 562 × 33

Copy and complete.

16. $55 \times 79 = (5 \times \blacksquare) \times 79$

17. $27 \times 267 = 801 \times \blacksquare$

18. $25 \times (898 \times 4) = 100 \times \blacksquare$

19. $(18 \times 23) \times (47 \times 13) = (13 \times 23) \times (9 \times \blacksquare)$

Solve.

20. A store buys 115 ski outfits from a distributor at $85 each. What is the total cost?

21. During the winter season, 35 pairs of a new model of ski boots were sold for $145 a pair. How many dollars worth of ski boots were sold?

Letter Logic

Each letter stands for a different digit. Rewrite the problems with numerals.

VZVZ × 2 = X2X2Z	YZ × 2 = XZZ	YVZ × V = TTVZ

Three-Digit Multipliers

A downtown department store had an average of 948 customers per day all year. If there are 296 shopping days in a year, how many customers came to the store during the year?

$$948 \times 296 = \blacksquare$$

$$948 \times (200 + 90 + 6) = \blacksquare$$

Multiply
6 ones × 948.

```
  2 4
  9 4 8
× 2 9 6
-------
  5 6 8 8
```

Multiply
9 tens × 948.

```
    4 7
  9 4 8
×   2 9 6
---------
  5 6 8 8
8 5 3 2 0
```

Multiply
2 hundreds × 948.

```
      1
  9 4 8
×   2 9 6
---------
  5 6 8 8
8 5 3 2 0
1 8 9 6 0 0
```

Add.

```
    948
×   296
---------
  5 688
 85 320
189 600
---------
280 608
```

280 608 customers came to the store during the year.

EXERCISES

Find the product.

1. 538 × 4	2. 538 × 20	3. 538 × 100	4. 538 × 124
5. 957 × 2	6. 957 × 30	7. 957 × 600	8. 957 × 632
9. 605 × 243	10. 702 × 657	11. 908 × 876	12. 407 × 587
13. 653 × 231	14. 584 × 234	15. 885 × 734	16. 986 × 528

PRACTICE

Find the product.

1. 432 × 21	**2.** 569 × 32	**3.** 768 × 45	**4.** 586 × 132	**5.** 976 × 121
6. 304 × 123	**7.** 708 × 457	**8.** 605 × 621	**9.** 209 × 897	**10.** 707 × 238
11. 421 × 322	**12.** 653 × 433	**13.** 857 × 555	**14.** 987 × 658	**15.** 394 × 869

Solve.

16. An arena has 125 rows of seats with 110 seats in each row. How many seats are there in all?

17. Every week, 33 newspapers and 52 magazines are delivered to a popular news stand. How many items are delivered in one year?

18. What number is 111 times greater than 345?

Predictable Products

Use a calculator to find the product. Do the work inside the parentheses first.

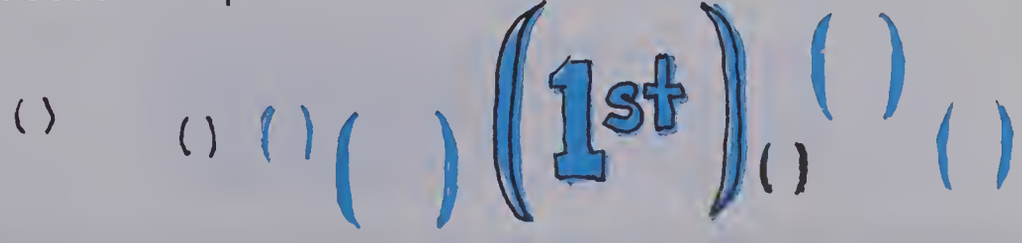
a. $46 \times (117 + 83) \longrightarrow (46 \times 117) + (46 \times 83)$

b. $95 \times (252 + 48) \longrightarrow (95 \times 252) + (95 \times 48)$

c. $150 \times (459 + 41) \longrightarrow (150 \times 459) + (150 \times 41)$

d. $265 \times (324 + 676) \longrightarrow (265 \times 324) + (265 \times 676)$

What did you notice about each pair?



Zero in the Multiplier

A large department store pays each of its 105 employees $298 per week. How much money does the store need each week to pay these salaries?

$$298 \times 105 = \blacksquare$$
$$298 \times (100 + 5) = \blacksquare$$

Multiply
5 ones × 298.

$$\begin{array}{r} 4\ 4 \\ 2\ 9\ 8 \\ \times\ 1\ 0\ 5 \\ \hline 1\ 4\ 9\ 0 \end{array}$$

Multiply
1 hundred × 298.

$$\begin{array}{r} 2\ 9\ 8 \\ \times\ 1\ 0\ 5 \\ \hline 1\ 4\ 9\ 0 \\ 2\ 9\ 8\ 0\ 0 \end{array}$$

Add.

$$\begin{array}{r} 298 \\ \times\ 105 \\ \hline 1\ 490 \\ 29\ 800 \\ \hline 31\ 290 \end{array}$$

The department store needs $31 290 each week.

EXERCISES

Find the product.

1. 256×100	**2.** 256×106	**3.** 475×100	**4.** 475×107
5. 342×200	**6.** 342×204	**7.** 123×200	**8.** 123×202
9. 758×400	**10.** 758×403	**11.** 841×600	**12.** 841×607

13. Copy and complete the table.

×	10	100	1000	10 000	100 000
9					
58					
317					

PRACTICE

Find the product.

1. 317×202	**2.** 653×303	**3.** 948×440	**4.** 726×550
5. 645×205	**6.** 673×800	**7.** 486×780	**8.** 965×806
9. 573×670	**10.** 834×960	**11.** 275×700	**12.** 589×902

13. Copy and complete the table.

×	10	100	1000	10 000	100 000
24					
282					
845					

First place parentheses around the easier multiplication.
Find the product.

14. $41 \times 50 \times 2$	**15.** $79 \times 25 \times 4$	**16.** $6 \times 50 \times 12$
17. $50 \times 4 \times 27$	**18.** $22 \times 5 \times 80$	**19.** $40 \times 8 \times 5$

Solve.

20. During a heat wave, a department store sold 324 air conditioners at $306 each. How much money did they receive?

USING THE CALCULATOR

Use $<$, $>$, or $=$ for ●.

a. $10 \times 10 \times 10$ ● $4 \times 4 \times 4 \times 4 \times 4$

b. $5 \times 5 \times 5 \times 5 \times 5$ ● $10 \times 10 \times 10 \times 10$

c. $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$ ● $8 \times 8 \times 8$

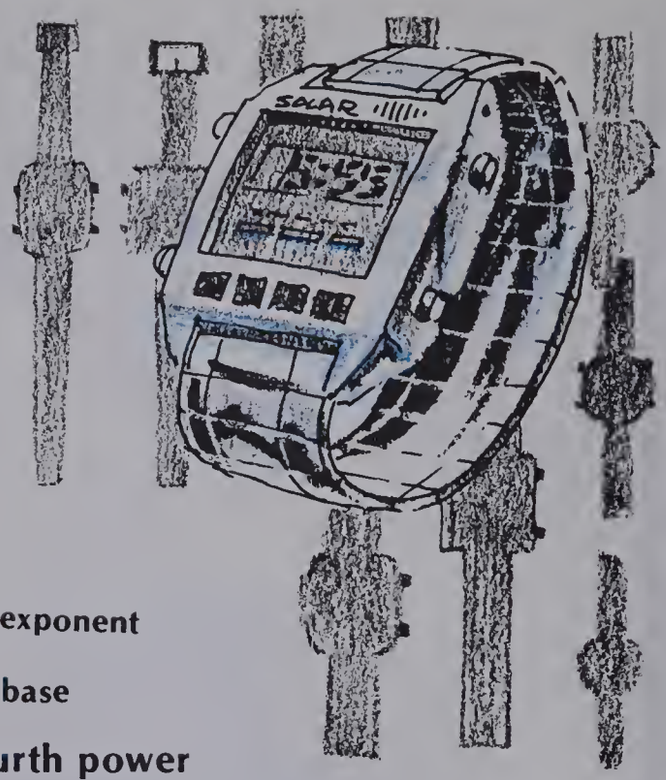
d. $1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1$ ● 2×2

e. $10 \times 10 \times 10 \times 10 \times 10$ ● $7 \times 7 \times 7 \times 7 \times 7 \times 7$

f. $9 \times 9 \times 9$ ● $3 \times 3 \times 3 \times 3 \times 3 \times 3$

Exponents

Digital watches went on sale at a large department store. On the first day of the sale, only 5 watches were sold. On the second day, 5 times that many were sold. On the third day, 5 times as many again were sold. On the fourth day, 5 times as many were sold again! What were the total sales on the fourth day?



$5 \times 5 \times 5 \times 5 = 625$ or 5^4 (exponent: 4, base: 5)

five to the fourth power

EXERCISES

1. Write the base numbers: 6^2, 10^5, 5^4, 8^9.
2. Write the exponents: 5^8, 4^3, 3^7, 6^1.

Copy and complete.

3. $\blacksquare^3 = 3 \times 3 \times 3 = 27$
   $\blacksquare^2 = 3 \times 3 = 9$
   $\blacksquare^1 = 3$
4. $6^3 = \blacksquare \times \blacksquare \times \blacksquare = 216$
   $6^2 = \blacksquare \times \blacksquare = 36$
   $6^1 = \blacksquare$
5. $5^3 = \blacksquare \times \blacksquare \times \blacksquare = 125$
   $5^2 = \blacksquare \times \blacksquare = 25$
   $5^1 = \blacksquare$
6. $9^3 = \blacksquare \times \blacksquare \times \blacksquare = 729$
   $9^2 = \blacksquare \times \blacksquare = 81$
   $9^1 = \blacksquare$
7. $4^3 = 4 \times 4 \times 4 = \blacksquare$
8. $1^5 = 1 \times 1 \times 1 \times 1 \times 1 = \blacksquare$
9. $2^3 = \blacksquare \times \blacksquare \times \blacksquare = \blacksquare$
10. $7^2 = \blacksquare \times \blacksquare = \blacksquare$
11. $10^3 = \blacksquare \times \blacksquare \times \blacksquare = \blacksquare$
12. $8^2 = \blacksquare \times \blacksquare = \blacksquare$
13. $11^2 = \blacksquare \times \blacksquare = \blacksquare$
14. $10^1 = \blacksquare$
15. $4^1 = \blacksquare$, $4^2 = \blacksquare$, $4^3 = \blacksquare$
16. $2^1 = \blacksquare$, $2^2 = \blacksquare$, $2^3 = \blacksquare$
17. $10^1 = \blacksquare$, $10^2 = \blacksquare$, $10^3 = \blacksquare$, $10^4 = \blacksquare$, $10^5 = \blacksquare$, $10^6 = \blacksquare$

Write the missing exponent.

18. $500 = 5 \times 100$
    $500 = 5 \times 10^{\blacksquare}$
19. $3000 = 3 \times 1000$
    $3000 = 3 \times 10^{\blacksquare}$
20. $90\,000 = 9 \times 10\,000$
    $90\,000 = 9 \times 10^{\blacksquare}$

PRACTICE

1. Write the base numbers: 3^7, 5^5, 8^1, 10^{10}
2. Write the exponents: 2^3, 5^1, 12^8, 6^{12}

Calculate.

3. 5^2	**4.** 10^3	**5.** 5^4	**6.** 9^2
7. 2^4	**8.** 20^2	**9.** 3^3	**10.** 1^4
11. 12^2	**12.** 6^4	**13.** 3^2	**14.** 6^3
15. 1^7	**16.** 7^3	**17.** 40^2	**18.** 10^2
19. 16^4	**20.** 10^1	**21.** 10^6	**22.** 10^3

Write the missing exponent.

23. $600 = 6 \times 100$ $600 = 6 \times 10^{\blacksquare}$	**24.** $9000 = 9 \times 1000$ $9000 = 9 \times 10^{\blacksquare}$	**25.** $20\,000 = 2 \times 10\,000$ $20\,000 = 2 \times 10^{\blacksquare}$
26. $400 = 4 \times 10^{\blacksquare}$	**27.** $7000 = 7 \times 10^{\blacksquare}$	**28.** $50\,000 = 5 \times 10^{\blacksquare}$

REVIEW

Find the product.

A8

1. 36 × 4	**2.** 517 × 6	**3.** 308 × 7	**4.** 9561 × 8

A9

5. 65 × 21	**6.** 46 × 34	**7.** 76 × 28	**8.** 517 × 49

A10

9. 435 × 212	**10.** 605 × 247	**11.** 508 × 777	**12.** 649 × 785

A11

13. 635 × 200	**14.** 498 × 350	**15.** 217 × 309	**16.** 986 × 709

A12

17. 4^2	**18.** 10^5	**19.** 2^4	**20.** 8^3

Estimating Products

The Fishers want to tile their kitchen floor. They need 18 boxes of floor tiles. Each box costs $7.89. Can they buy the tile if they have saved $175.00?

Estimate the cost first.

Round each number to its first digit.

$7.89 → $8.00

× 18 → × 20

Multiply.

$8.00 × 20 = $160.00

Estimated cost: $160.00

Money saved: $175.00

Yes, they have saved enough money.

EXERCISES

Estimate the product.

1. 317 → 300, × 25 → × 30, ■

2. 895 → ■, × 12 → × ■, ■

3. 422 → ■, × 689 → × ■, ■

4. 56, × 3.4; 60, × 3, ■

5. 21, × 1.9; × ■, ■

6. 43.8, × 72; × ■, ■

7. $5.12, × 58; $5.00, × 60, ■

8. $4.95, × 31; × ■, ■

9. $62.24, × 9; × ■, ■

10. 935 × 11

11. 7.8 × 69

12. $2.99 × 27

13. $5.01 × 21

14. 7.9 × 4.1

PRACTICE

Estimate the product.

1. $\begin{array}{r} 523 \\ \times\ 67 \\ \hline \end{array}$	**2.** $\begin{array}{r} 986 \\ \times\ 99 \\ \hline \end{array}$	**3.** $\begin{array}{r} 355 \\ \times\ 13 \\ \hline \end{array}$	**4.** $\begin{array}{r} 779 \\ \times\ 25 \\ \hline \end{array}$
5. $\begin{array}{r} 32 \\ \times 1.8 \\ \hline \end{array}$	**6.** $\begin{array}{r} 9.8 \\ \times 7.9 \\ \hline \end{array}$	**7.** $\begin{array}{r} 1.4 \\ \times\ 16 \\ \hline \end{array}$	**8.** $\begin{array}{r} 67.3 \\ \times\ 29 \\ \hline \end{array}$
9. $\begin{array}{r} \$3.55 \\ \times\ \ 41 \\ \hline \end{array}$	**10.** $\begin{array}{r} \$6.25 \\ \times\ \ 76 \\ \hline \end{array}$	**11.** $\begin{array}{r} \$4.09 \\ \times\ \ 62 \\ \hline \end{array}$	**12.** $\begin{array}{r} \$76.77 \\ \times\ \ 89 \\ \hline \end{array}$

Solve.

13. Estimate the cost of 3 lawn chairs at $12.95 a chair.

14. Estimate the length of wood needed for shelves if each of 9 shelves is 0.75 m.

15. A box contains 24 packages of flour. Estimate the mass of the contents if each package has a mass of 2.5 kg.

16. Estimate the cost of 18 T-shirts at $7.95 a shirt.

17. Estimate the number of days in the life of a man who has lived 82 years.

Using Your Head

Find the answers to these equations without using a paper and pencil.

a. $3^2 - 8 = \blacksquare$

b. $(4^3 - 4^2) \times 0 = \blacksquare$

c. $5^3 \times (47 - 47) = \blacksquare$

d. $(9867 - 9867) + 1^3 = \blacksquare$

e. $7694 \times (10^4 \times 0) = \blacksquare$

f. $(6^2 \times 0) + 1^9 = \blacksquare$

Multiplying Money

What is the cost of 4 pairs of skates at $59.95 a pair?

Estimate.

$60
× 4
$240

Actual cost.

$59.95
× 4
$239.80

What is the cost of 17 jerseys at $19.99 a jersey?

Estimate.

$20
× 17
$340

Actual cost.

$19.99
× 17
139 93
199 90
$339.83

EXERCISES

Multiply.

1. 9¢ × 5	**2.** $0.09 × 5	**3.** 8¢ × 6	**4.** $0.08 × 6	**5.** $0.80 × 6
6. 28¢ × 7	**7.** $0.28 × 7	**8.** $2.80 × 7	**9.** $20.80 × 7	**10.** $20 × 7
11. $85 × 56	**12.** $8.50 × 56	**13.** $80.50 × 56	**14.** $80.05 × 56	**15.** $800.50 × 56

Estimate first, then find the actual cost.

16. $3.59 → $4
× 12 → × 10
■ ■

17. $16.27 → $16
× 22 → × ■
■ ■

18. $186.50 → ■
× 95 → × ■
■ ■

PRACTICE

Multiply.

1. \$0.08 × 9	**2.** \$0.04 × 7	**3.** \$0.75 × 6	**4.** \$3.64 × 7	**5.** \$13.64 × 4
6. \$55 × 20	**7.** \$38 × 15	**8.** \$2.95 × 34	**9.** \$6.79 × 14	**10.** 8.25 × 75
11. \$435 × 12	**12.** \$685 × 200	**13.** \$23.68 × 18	**14.** \$46.79 × 45	**15.** 367.52 × 75

Estimate first, then give the actual cost.

16. A four-seat toboggan costs \$32.98. How much would 3 toboggans cost?

17. Floor hockey sticks cost \$12.95 each. How much would 30 sticks cost?

18. Running shoes cost \$29.45 a pair. How much would 5 pairs cost?

19. Soccer balls cost \$42.85 each. How much would 9 soccer balls cost?

A Wise Choice

Jacob has agreed to cut the grass 12 times. He can choose either of two plans for payment.

A. \$1.00 for each of the 12 times.

B. 1¢ for the first time, double 1¢ for the second time, double that for the third time, and so on.

Complete the chart to see which is the better plan.
Use a calculator.

	Plan A		Plan B	
	Pay	Total so far	Pay	Total so far
1	\$1.00	\$1.00	\$0.01	\$0.01
2	1.00	2.00	0.02	0.03
3	1.00	3.00	0.04	0.07
4	1.00	4.00	0.08	0.15
5	1.00		0.16	
6				
11				
12				
Total after 12 times			Total after 12 times	

Multiplying Tenths

Mr. Wolsky bought 24.5 m of fabric to make draperies. The fabric was on sale for \$12/m. How much did he pay for the fabric?

Estimate: $25 \times \$12 = \$300$

Multiply
2 ones × 24.5.

$$\begin{array}{r} {\scriptstyle 1} \\ 24.5 \\ \times\ 12 \\ \hline 490 \end{array}$$

Multiply
1 ten × 24.5.

$$\begin{array}{r} 24.5 \\ \times\ 12 \\ \hline 490 \\ 2450 \end{array}$$

Add.

$$\begin{array}{r} 24.5 \\ \times\ 12 \\ \hline 490 \\ 2450 \\ \hline 2940 \end{array}$$

Write the
decimal point.

$$\begin{array}{r} 24.5 \\ \times\ 12 \\ \hline 490 \\ 2450 \\ \hline 294.0 \end{array}$$

Mr. Wolsky paid \$294.00 for the fabric.

EXERCISES

Estimate first, then multiply.

1. $\begin{array}{r} 2.3 \longrightarrow 2 \\ \times\ 6 \longrightarrow \times 6 \end{array}$

2. $\begin{array}{r} 68.9 \longrightarrow 70 \\ \times\ 9 \longrightarrow \times\ 9 \end{array}$

3. $\begin{array}{r} 7.9 \longrightarrow \blacksquare \\ \times\ 4 \longrightarrow \times\ 4 \end{array}$

4. $\begin{array}{r} 3.6 \longrightarrow \blacksquare \\ \times\ 23 \longrightarrow \times \blacksquare \end{array}$

5. $\begin{array}{r} 9.5 \longrightarrow \blacksquare \\ \times\ 77 \longrightarrow \times \blacksquare \end{array}$

6. $\begin{array}{r} 3.2 \longrightarrow \blacksquare \\ \times\ 98 \longrightarrow \times \blacksquare \end{array}$

Multiply.

7. $\begin{array}{r} 20.4 \\ \times\ 323 \end{array}$

8. $\begin{array}{r} 323 \\ \times 20.4 \end{array}$

9. $\begin{array}{r} 60.5 \\ \times\ 415 \end{array}$

10. $\begin{array}{r} 415 \\ \times 60.5 \end{array}$

11. $\begin{array}{r} 789 \\ \times 60.5 \end{array}$

Copy and complete each table.

12.

×	0.4	3.8	42.6	184.5
10				

13.

×	6	35	89	679
0.1				

PRACTICE

Find the product.

1. 5.7×9	**2.** 3.8×6	**3.** 4.2×5	**4.** 59.6×2	**5.** 38.7×6
6. 5.9×68	**7.** 68×5.9	**8.** 3.5×26	**9.** 45×5.7	**10.** 9.2×65
11. 13.4×202	**12.** 202×13.4	**13.** 472×35.8	**14.** 38.9×252	**15.** 753×94.7

Copy and complete.

16. $5.3 \times 46 = \blacksquare \times 5.3$

17. $\blacksquare \times 245 = 245 \times 13.8$

18. $(1.5 \times 3) \times 5 = \blacksquare \times (3 \times 5)$

19. $4 \times (2.5 \times 8) = (4 \times \blacksquare) \times 8$

Copy and complete each table.

20.

×	0.5	2.9	87.3	655.9
10				

21.

×	7	94	19	806
0.1				

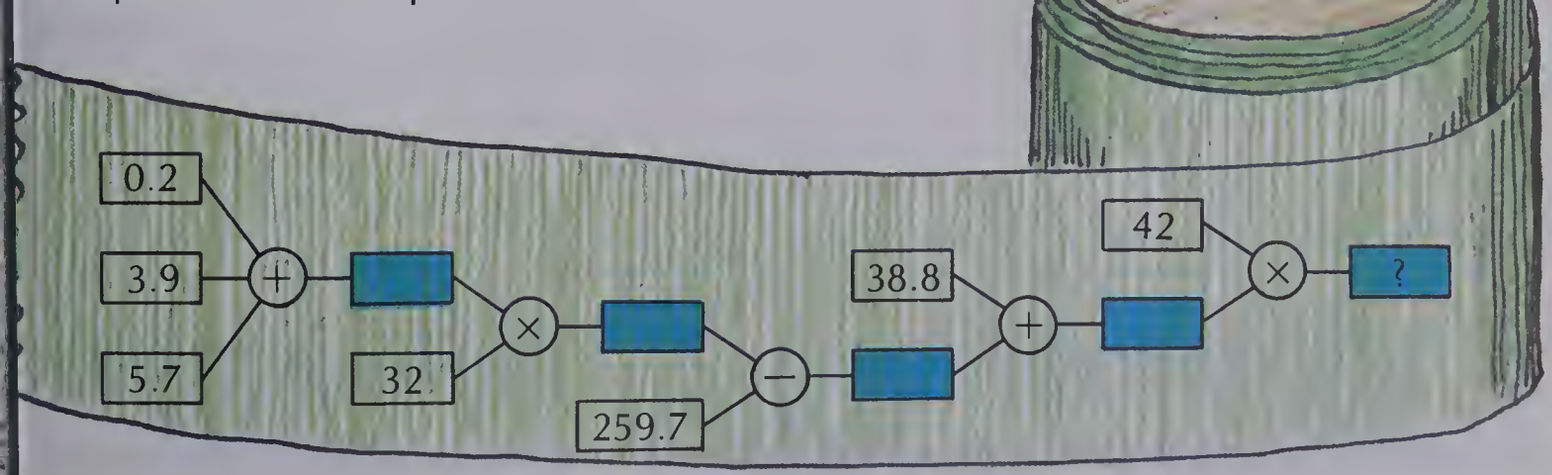
Estimate first, then solve.

22. How much would 0.7 m of ribbon cost at \$3/m?

23. Corduroy is \$7/m. What is the cost of 3.5 m?

Math Ribbon

Complete all the steps.



Multiplying Hundredths

Ms. Lee bought 15 cans of paint for the exterior of her house and garage. Each can contained 4.55 L of paint. How many litres of paint did she buy?

Estimate: $15 \times 5 = 75$ L

Multiply
5 ones × 4.55.

$$\begin{array}{r} {\scriptstyle 2\ 2} \\ 4.5\ 5 \\ \times\ \ 1\ 5 \\ \hline 2\ 2\ 7\ 5 \end{array}$$

Multiply
1 ten × 4.55.

$$\begin{array}{r} 4.5\ 5 \\ \times\ \ 1\ 5 \\ \hline 2\ 2\ 7\ 5 \\ 4\ 5\ 5\ 0 \end{array}$$

Add.

$$\begin{array}{r} 4.5\ 5 \\ \times\ \ 1\ 5 \\ \hline 2\ 2\ 7\ 5 \\ 4\ 5\ 5\ 0 \\ \hline 6\ 8\ 2\ 5 \end{array}$$

Write the
decimal point.

$$\begin{array}{r} 4.5\ 5 \\ \times\ \ 1\ 5 \\ \hline 2\ 2\ 7\ 5 \\ 4\ 5\ 5\ 0 \\ \hline 6\ 8.2\ 5 \end{array}$$

Ms. Lee bought 68.25 L of paint.

EXERCISES

Estimate first, then multiply.

1. $4.22 \rightarrow 4$, $\times\ 3 \rightarrow \times 3$

2. $0.75 \rightarrow \blacksquare$, $\times\ 9 \rightarrow \times \blacksquare$

3. $47.08 \rightarrow \blacksquare$, $\times\ 8 \rightarrow \times \blacksquare$

4. $0.83 \rightarrow 1$, $\times\ 28 \rightarrow \times 30$

5. $0.94 \rightarrow \blacksquare$, $\times\ 67 \rightarrow \times \blacksquare$

6. $5.99 \rightarrow \blacksquare$, $\times\ 12 \rightarrow \times \blacksquare$

Multiply.

7. 4.06×132

8. 132×4.06

9. 3.42×971

10. 971×3.42

11. 645×2.63

Copy and complete each table.

12.

×	0.6	4.76	81.38
100			

13.

×	5	72	90	532
0.01				

PRACTICE

Find the product.

1. 3.46 × 2	**2.** 9.03 × 8	**3.** 0.58 × 5	**4.** 1.17 × 9	**5.** 54.63 × 7
6. 0.59 × 32	**7.** 32 × 0.59	**8.** 23 × 0.46	**9.** 0.79 × 38	**10.** 66 × 0.73
11. 7.05 × 231	**12.** 567 × 2.04	**13.** 2.16 × 276	**14.** 597 × 4.83	**15.** 868 × 4.09

Calculate.

16. 5.17×24

17. 35×6.82

18. $(1.25 \times 4) \times 6$

19. $(3 \times 3.05) \times 7$

Copy and complete each table.

20.

×	0.2	4.23	74.29
100			
10			

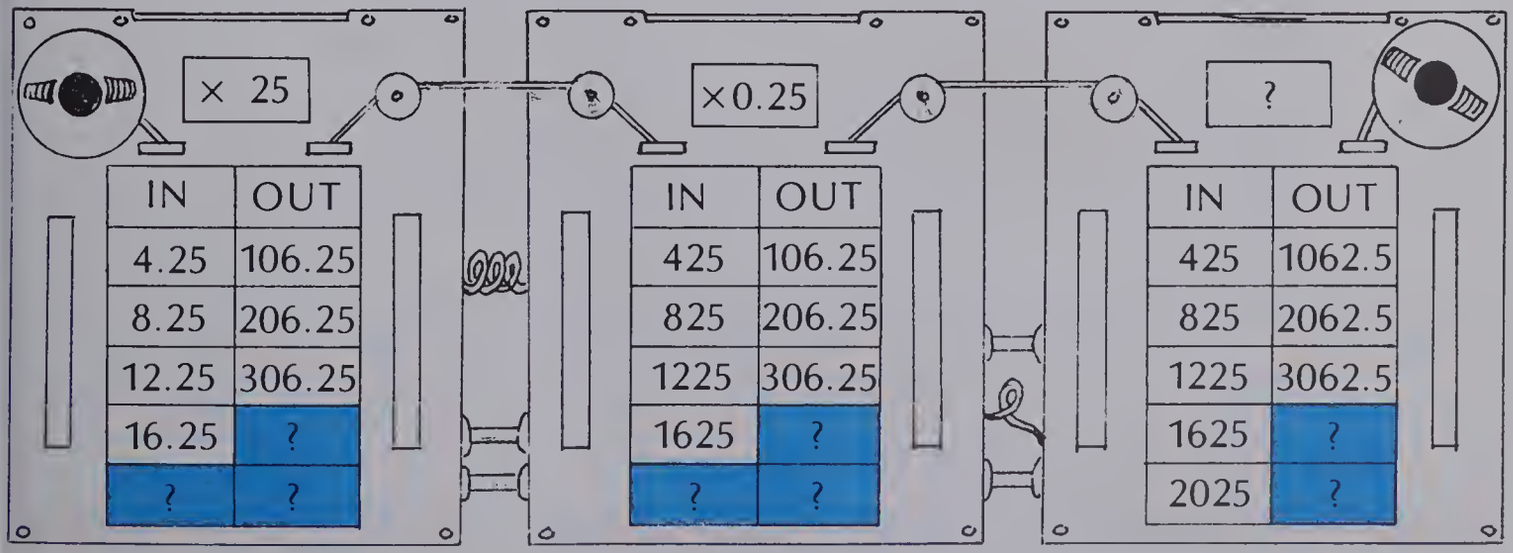
21.

×	8	43	13	507
0.01				
0.1				

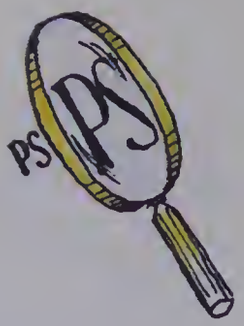
Estimate first, then solve.

22. A can of mahogany wood stain contains 4.19 L. How many litres are there in 4 cans?

Computer Patterns



Solving Problems Mentally



Try to solve each problem mentally.
Write the answer for each.

1. If Judy has $25, how many $5 picture frames can she buy?
   a. 125 **b.** 30 **c.** 20 **d.** 5

2. If Jim buys an old coin for $3 and sells it for $6, how much does he make?
   a. $18 **b.** $9 **c.** $3 **d.** $2

3. If Pat earns $20 in wages and $5 in tips, how much money does she make?
   a. $4 **b.** $15 **c.** $25 **d.** $100

4. If Mary buys 4 skirts for $8 each, how much does she spend?
   a. $2 **b.** $4 **c.** $12 **d.** $32

5. If Bill's mass is 60 kg and Jill is 30 kg lighter, what is Jill's mass?
   a. 20 kg **b.** 30 kg **c.** 60 kg **d.** 90 kg

6. If John is 40 years old and Sheila is 10 years older, what is Sheila's age?
   a. 30 **b.** 40 **c.** 50 **d.** 60

7. What is the perimeter of a rectangular garden that is 5 m by 6 m?
   a. 11 m **b.** 30 m **c.** 22 m **d.** 60 m

8. If it is 10:00 now, what time will it be 10 h from now?
   a. 15:00 **b.** 18:00 **c.** 22:00 **d.** 20:00

9. How many $20 bills are needed to pay a debt of $500?
   a. 25 **b.** 20 **c.** 15 **d.** 30

10. What is the area of a rectangular room that is 3 m by 4 m?
    a. 7 m^2 **b.** 12 m^2 **c.** 15 m^2 **d.** 24 m^2

PRACTICE

Mentally compute the answers to these problems.

1. How many seats are in an auditorium that contains 25 rows of 10 seats?

2. How much does a $40 hotel room cost with a $15 discount coupon?

3. How many tables of 4 are needed to seat 200 people at a dance?

4. If today is Wednesday, what day will it be 10 days from now?

5. If it is 9 A.M. now, what time will it be 50 hours from now?

6. What is the volume of a 2 m by 3 m by 4 m room?

7. How much change should you get from a $5 bill when you are paying for a $3.80 item?

8. What is the total cost of 99 tickets at 25¢ each?

REVIEW

A13 Copy and write an estimated product.

1.	2.	3.	4.
895 × 12	3.1 × 2.8	$5.05 × 78	$41.95 × 41

M3 Multiply.

5.	6.	7.	8.
6¢ × 8	$0.07 × 3	$40 × 19	$40.06 × 32

A14

9.	10.	11.	12.
5.7 × 3	7.9 × 8	4.6 × 85	312 × 12.5

A15

13.	14.	15.	16.
5.25 × 6	0.96 × 7	2.78 × 93	383 × 1.95

TEST UNIT 3

Find the product.

1. 142×2	**2.** 638×3	**3.** 509×6	**4.** 4123×5
5. 23×12	**6.** 65×13	**7.** 66×77	**8.** 135×28
9. 204×121	**10.** 703×436	**11.** 995×415	**12.** 897×638
13. 172×500	**14.** 963×150	**15.** 486×204	**16.** 713×809

17. 5^2	**18.** 10^4	**19.** 2^5	**20.** 7^1
21. 5^3	**22.** 10^2	**23.** 3^3	**24.** 4^2

Copy and complete.

25. $9000 = 9 \times 10^{\blacksquare}$ **26.** $20\,000 = 2 \times 10^{\blacksquare}$

Estimate the product.

27. 621×39 **28.** 79×2.8 **29.** 137×5.19

Multiply.

30. $6¢ \times 9$	**31.** $\$0.08 \times 7$	**32.** $\$3.05 \times 25$	**33.** $\$14.95 \times 68$
34. 4.2×3	**35.** 46×2.5	**36.** 62.3×405	**37.** 737×30.6
38. 6.75×3	**39.** 93×0.27	**40.** 5.08×123	**41.** 697×8.05

ING BACK

COMPUTATION: +, −

Find the sum.

1. 268 + 21

2. \$7.25 + 0.38

3. 648 + 727

4. 135 + 679

5. 3124 + 652

6. \$25.36 + 55.84

7. 31 252 + 8 392

8. 79 286 + 97 695

9. 215 + 69 + 512

10. \$50.27 + 5.36 + 14.98

11. 61 249 + 87 + 5 765

12. \$75.23 + 1.12 + 88.39

13. 79 + 2 + 34 + 123

14. 6.4 + 32 + 1.12 + 5.119

Find the difference.

15. 394 − 26

16. 408 − 129

17. \$7.13 − 4.50

18. 4025 − 673

19. 6352 − 2814

20. \$20.00 − 14.95

21. 30 110 − 7 862

22. 80 008 − 39 119

Subtract. Check by adding.

23. 2.3 − 1.7

24. 8.3 − 0.15

25. 88.0 − 0.579

26. 3.0 − 0.75

Solve.

27. On a ski trip in the Rocky Mountains, Carl spent \$250 on air fare, \$399 on lodgings and lift tickets, and \$125 on food and other expenses.

a. How much did he spend in all?

b. How much did he have left from \$800?

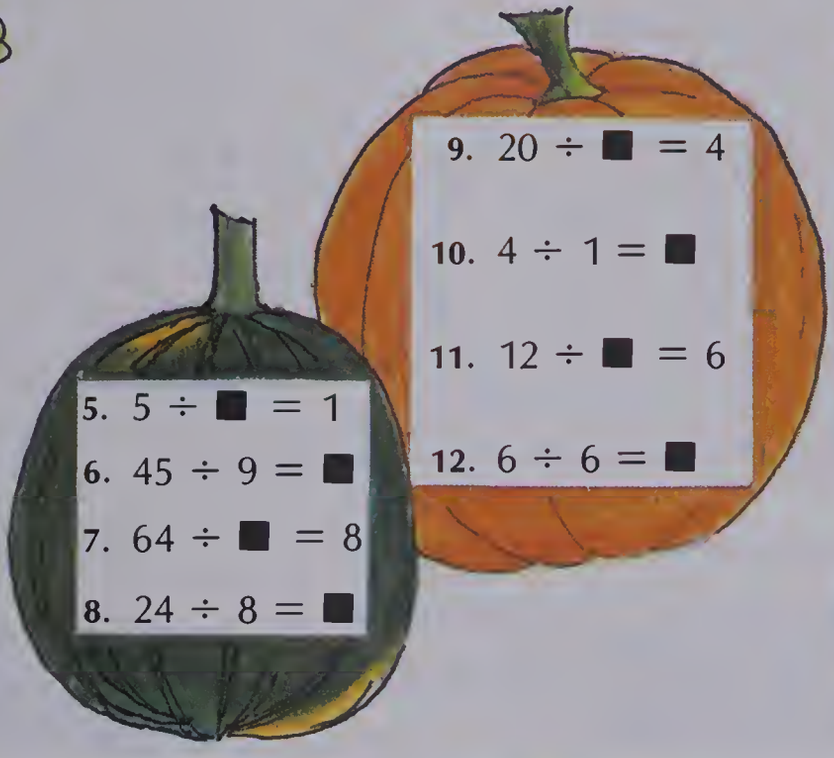
UNIT 4
DIVISION

A Market Match

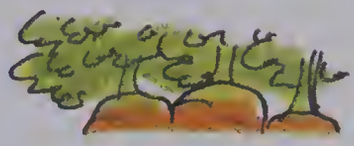
Copy and complete each division equation. Match the answers in the first set with the answers in the second set.

For each kind of vegetable, can you find *one* pair of answers that *does not match*?

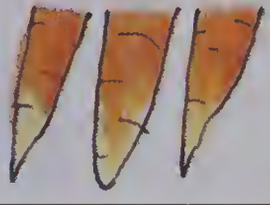
1. $49 \div 7 = \blacksquare$
2. $8 \div \blacksquare = 8$
3. $36 \div 6 = \blacksquare$
4. $21 \div \blacksquare = 7$

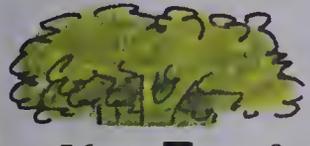


5. $5 \div \blacksquare = 1$
6. $45 \div 9 = \blacksquare$
7. $64 \div \blacksquare = 8$
8. $24 \div 8 = \blacksquare$
9. $20 \div \blacksquare = 4$
10. $4 \div 1 = \blacksquare$
11. $12 \div \blacksquare = 6$
12. $6 \div 6 = \blacksquare$

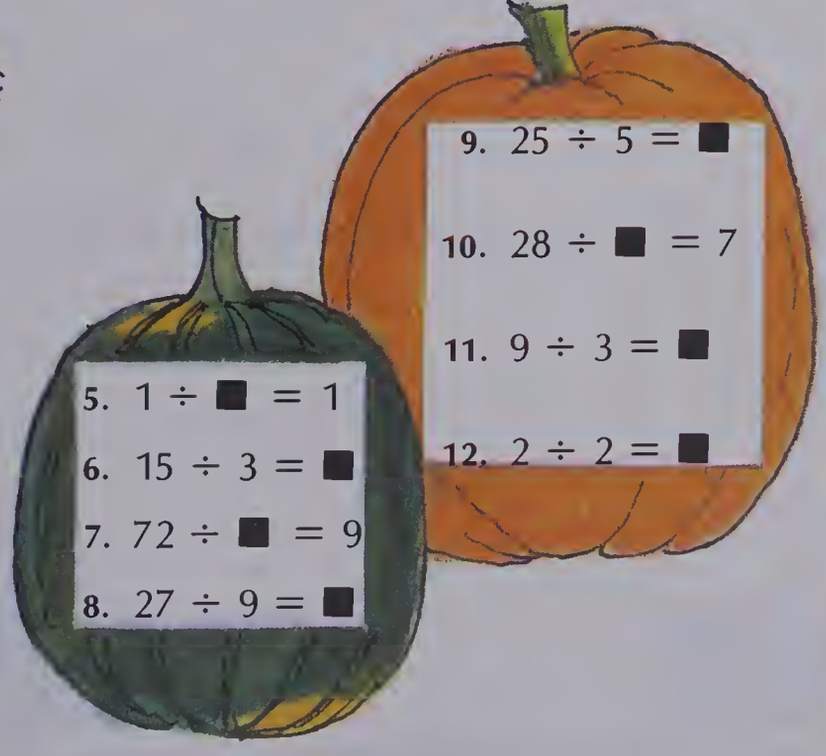


13. $32 \div 4 = \blacksquare$
14. $54 \div \blacksquare = 9$
15. $81 \div 9 = \blacksquare$
16. $63 \div \blacksquare = 9$



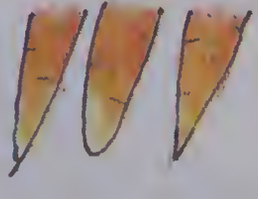


1. $56 \div \blacksquare = 8$
2. $9 \div 9 = \blacksquare$
3. $56 \div \blacksquare = 7$
4. $12 \div 4 = \blacksquare$



5. $1 \div \blacksquare = 1$
6. $15 \div 3 = \blacksquare$
7. $72 \div \blacksquare = 9$
8. $27 \div 9 = \blacksquare$
9. $25 \div 5 = \blacksquare$
10. $28 \div \blacksquare = 7$
11. $9 \div 3 = \blacksquare$
12. $2 \div 2 = \blacksquare$

13. $48 \div \blacksquare = 6$
14. $42 \div 7 = \blacksquare$
15. $36 \div \blacksquare = 4$
16. $7 \div 7 = \blacksquare$



Two-Digit Dividends

Natalie collected 60 ears of Indian corn on her farm to sell at the Saturday farmers' market. She tied the ears in bundles of 7 ears each. How many bundles did she have?

$60 \div 7 = \blacksquare$

Estimate.

$$7\overline{)60}$$

Multiply and subtract.

$$\begin{array}{r} 8 \\ 7\overline{)60} \\ -56 \\ \hline 4 \end{array}$$

Write the remainder.

$$\begin{array}{r} 8\text{R}4 \\ 7\overline{)60} \\ -56 \\ \hline 4 \end{array}$$

Natalie had 8 bundles of 7 ears each. 4 ears were left over.

Check: Quotient × divisor. → $8 \times 7 = 56$

Add remainder. → $56 + 4 = 60$

Dividend. → 60

EXERCISES

Find the quotient. Check your answer.

1. $5\overline{)14}$	**2.** $4\overline{)23}$	**3.** $7\overline{)46}$	**4.** $9\overline{)65}$	**5.** $8\overline{)47}$
6. $6\overline{)27}$	**7.** $3\overline{)15}$	**8.** $8\overline{)60}$	**9.** $3\overline{)23}$	**10.** $9\overline{)75}$
11. $11 \div 2$	**12.** $19 \div 5$	**13.** $64 \div 8$	**14.** $39 \div 7$	**15.** $33 \div 4$
16. $65 \div 7$	**17.** $80 \div 9$	**18.** $27 \div 6$	**19.** $40 \div 5$	**20.** $52 \div 8$
21. $47 \div 5$	**22.** $70 \div 8$	**23.** $31 \div 6$	**24.** $19 \div 3$	**25.** $56 \div 6$

Copy and complete the tables.

26.

÷	6	8	7
42			
27			

27.

÷	9	7	8
56			
49			

PRACTICE

Find the quotient. Check your answer.

1. $4\overline{)35}$	**2.** $5\overline{)49}$	**3.** $6\overline{)54}$	**4.** $7\overline{)64}$	**5.** $7\overline{)33}$
6. $7\overline{)51}$	**7.** $6\overline{)30}$	**8.** $5\overline{)29}$	**9.** $4\overline{)23}$	**10.** $8\overline{)77}$
11. $6\overline{)50}$	**12.** $8\overline{)70}$	**13.** $4\overline{)36}$	**14.** $2\overline{)17}$	**15.** $7\overline{)60}$
16. $9\overline{)86}$	**17.** $7\overline{)50}$	**18.** $5\overline{)49}$	**19.** $4\overline{)33}$	**20.** $8\overline{)55}$
21. $42 \div 9$	**22.** $23 \div 3$	**23.** $47 \div 5$	**24.** $19 \div 4$	**25.** $67 \div 7$

For each checking statement, write a corresponding division.

26. $2 \times 3 + 2 = 8$
27. $7 \times 5 + 4 = 39$
28. $8 \times 7 + 3 = 59$
29. $8 \times 8 + 0 = 64$
30. $9 \times 8 + 7 = 79$
31. $6 \times 9 + 8 = 62$

Copy and complete the tables.

32.

÷	9	6	7
31			
45			

33.

÷	5	8	7
24			
36			

Solve.

34. What is the cost of one homemade cookie if 5 sell for 40¢?

35. What is the cost of one fresh daisy if 8 sell for 80¢?

Letter Logic

Each letter stands for a different digit.
Rewrite each letter as a numeral.

$$B\overline{)AZ}\quad G \qquad C\overline{)AG}\quad G \qquad B\overline{)BC}\quad AA \text{ remainder } A$$

$$A+A=B \qquad B+A=C \qquad A-A=Z \qquad A\overline{)A}\quad A \qquad A \times A = A$$

Three-Digit Dividends

The manager of a farmers' market has 2 folding chairs for each farmer to use at the booths. If the manager had 175 chairs in all, how many farmers could get 2 chairs?

$175 \div 2 = \blacksquare$

Long Division

Divide the tens.

$$\begin{array}{r} 8 \\ 2\overline{)\,175} \\ -16 \\ \hline 1 \end{array}$$

Divide the ones.

$$\begin{array}{r} 87\text{R}1 \\ 2\overline{)\,175} \\ -16 \\ \hline 15 \\ -14 \\ \hline 1 \end{array}$$

Short Division

Divide the tens.

$$\begin{array}{r} 8 \\ 2\overline{)\,17_{1}5} \end{array}$$

Divide the ones. Write the remainder.

$$\begin{array}{r} 87\text{R}1 \\ 2\overline{)\,17_{1}5} \end{array}$$

Check:

87	quotient
× 2	divisor
174	
+ 1	remainder
175	dividend

87 farmers could get 2 chairs each. One chair is left over.

EXERCISES

Find the quotient. Check your answer.

1. $3\overline{)47}$	**2.** $2\overline{)29}$	**3.** $5\overline{)64}$	**4.** $7\overline{)92}$	**5.** $4\overline{)57}$
6. $6\overline{)71}$	**7.** $8\overline{)89}$	**8.** $2\overline{)77}$	**9.** $5\overline{)86}$	**10.** $3\overline{)44}$
11. $85 \div 3$	**12.** $69 \div 5$	**13.** $35 \div 2$	**14.** $57 \div 3$	**15.** $71 \div 4$
16. $124 \div 7$	**17.** $409 \div 6$	**18.** $376 \div 5$	**19.** $214 \div 9$	**20.** $500 \div 8$
21. $457 \div 8$	**22.** $532 \div 7$	**23.** $495 \div 6$	**24.** $713 \div 8$	**25.** $702 \div 9$

Divide each number by 5.

26. 63 **27.** 55 **28.** 87 **29.** 19 **30.** 44

PRACTICE

Find the quotient. Check your answer.

1. $2\overline{)28}$ 2. $3\overline{)68}$ 3. $4\overline{)95}$ 4. $5\overline{)90}$ 5. $6\overline{)87}$

6. $6\overline{)96}$ 7. $8\overline{)91}$ 8. $7\overline{)80}$ 9. $5\overline{)73}$ 10. $4\overline{)59}$

11. $291 \div 3$ 12. $173 \div 2$ 13. $355 \div 4$ 14. $564 \div 6$ 15. $397 \div 5$

16. $517 \div 6$ 17. $498 \div 5$ 18. $300 \div 4$ 19. $408 \div 9$ 20. $777 \div 8$

Copy and complete. Use $<$ or $>$.

21. $27 \div 5 \bullet 58 \div 7$
22. $78 \div 9 \bullet 62 \div 7$
23. $57 \div 4 \bullet 83 \div 6$
24. $287 \div 8 \bullet 191 \div 8$
25. $200 \div 9 \bullet 134 \div 6$
26. $235 \div 9 \bullet 80 \div 3$

Solve.

27. Two boys at the market made $38 in tips helping people load heavy boxes into their cars. How much money did each boy make?

28. If 3 stalks of celery sell for 99¢, what does 1 stalk cost?

Consumer Question

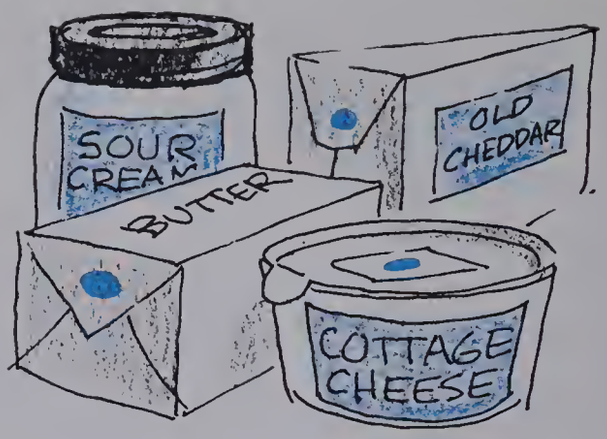
Which is the better buy?

a. one bar of soap for 49¢ **or** three bars of soap for $1.29

b. one tube of toothpaste for $1.19 **or** two tubes of toothpaste for $2.29

c. three boxes of tissues for $1.39 **or** five boxes of tissues for $2.44

Four-Digit Dividends



A farmer sold $3150 worth of fresh dairy products and smoked meats in September at the Saturday markets. In October, he sold half as much. How much did he sell in October?

$3150 ÷ 2 = ■

Long Division

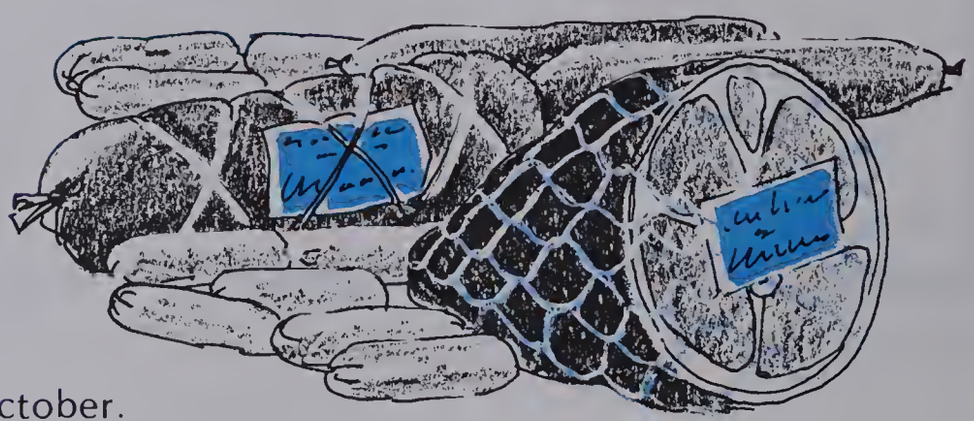
$$
\begin{array}{r}
1575 \\
2\overline{)\,3150} \\
-2 \\
\hline
11 \\
-10 \\
\hline
15 \\
-14 \\
\hline
10 \\
-10 \\
\hline
\end{array}
$$

Short Division

$$
\begin{array}{r}
1\,5\,7\,5 \\
2\overline{)\,3_1 1_1 5_1 0}
\end{array}
$$

Check:

$$
\begin{array}{rl}
1575 & \text{quotient} \\
\times\ \ 2 & \text{divisor} \\
\hline
3150 & \text{dividend}
\end{array}
$$



He sold $1575 worth in October.

EXERCISES

Find the quotient. Check your answer.

1. $2\overline{)317}$	2. $4\overline{)756}$	3. $5\overline{)730}$	4. $3\overline{)675}$
5. $6\overline{)829}$	6. $7\overline{)945}$	7. $8\overline{)917}$	8. $5\overline{)984}$
9. $7\overline{)1592}$	10. $6\overline{)4182}$	11. $5\overline{)1815}$	12. $9\overline{)7538}$
13. $2\overline{)5162}$	14. $3\overline{)4791}$	15. $5\overline{)6469}$	16. $4\overline{)7517}$
17. 6873 ÷ 3	18. 9786 ÷ 6	19. 7597 ÷ 4	20. 8995 ÷ 7

PRACTICE

Find the quotient.

1. $3\overline{)509}$	**2.** $4\overline{)948}$	**3.** $5\overline{)868}$	**4.** $4\overline{)885}$
5. $4\overline{)575}$	**6.** $5\overline{)603}$	**7.** $6\overline{)792}$	**8.** $7\overline{)806}$
9. $9\overline{)1647}$	**10.** $7\overline{)1092}$	**11.** $8\overline{)1080}$	**12.** $5\overline{)1245}$
13. $6\overline{)2740}$	**14.** $8\overline{)4482}$	**15.** $4\overline{)2351}$	**16.** $9\overline{)4693}$
17. $1983 \div 2$	**18.** $2795 \div 8$	**19.** $3455 \div 7$	**20.** $2195 \div 5$
21. $4693 \div 4$	**22.** $5830 \div 3$	**23.** $8976 \div 6$	**24.** $9590 \div 8$

Divide each number by 9.

25. 6219 **26.** 7362 **27.** 5499 **28.** 8073

Copy and complete the tables.

29.

÷	5	4
6230		
7955		
4090		

30.

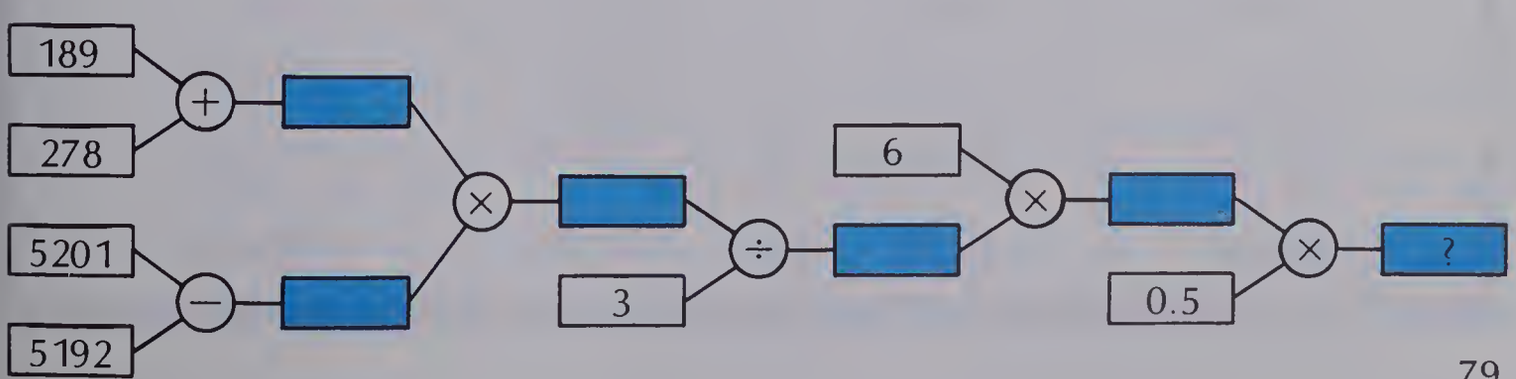
÷	3	7
6147		
2865		
9294		

Solve.

31. Four families sold their unwanted furniture and appliances at a flea market for $476. How much would each family receive if they were to share the money equally?

Math Hopscotch

Complete all the steps.



Zero in the Quotient

Mrs. Spencer sold fresh vegetables all summer at the weekend market and made $6129. How much did she make if she has to share it equally with her two assistants?

$6129 ÷ 3 = ■

Long Division

Estimate, multiply, and subtract.

```
  2
3)6129
 -6
  01
```

Can't divide. Write zero and try the next place.

```
  20
3)6129
 -6
  012
```

Estimate, multiply, and subtract.

```
  204
3)6129
 -6
  012
 -12
   09
```

```
  2043
3)6129
 -6
  012
 -12
   09
  -9
    0
```

She made $2043.

Short Division

```
  2 0 4 3
3)6 1¹2 9
```

Check:

```
  2043   quotient
× 3      divisor
------
  6129   dividend
```

EXERCISES

Find the quotient. Check your answer.

1. $2\overline{)614}$	2. $5\overline{)508}$	3. $7\overline{)751}$	4. $4\overline{)805}$
5. $7\overline{)1435}$	6. $2\overline{)2802}$	7. $9\overline{)8116}$	8. $8\overline{)5614}$
9. $3\overline{)9275}$	10. $6\overline{)6465}$	11. $5\overline{)5298}$	12. $4\overline{)8136}$
13. $3\overline{)27\,183}$	14. $7\overline{)49\,648}$	15. $8\overline{)23\,175}$	16. $4\overline{)12\,392}$
17. $4\overline{)8009}$	18. $3\overline{)9018}$	19. $6\overline{)6058}$	20. $8\overline{)8073}$

PRACTICE

Find the quotient.

1. $2\overline{)4165}$	**2.** $3\overline{)6924}$	**3.** $4\overline{)7803}$	**4.** $5\overline{)9005}$
5. $8\overline{)8073}$	**6.** $6\overline{)6547}$	**7.** $9\overline{)3152}$	**8.** $7\overline{)2801}$
9. $2\overline{)12\,001}$	**10.** $7\overline{)49\,004}$	**11.** $3\overline{)27\,011}$	**12.** $6\overline{)40\,020}$
13. $8\overline{)65\,324}$	**14.** $9\overline{)81\,819}$	**15.** $3\overline{)25\,503}$	**16.** $7\overline{)61\,982}$
17. $4\overline{)36\,327}$	**18.** $5\overline{)11\,225}$	**19.** $8\overline{)10\,628}$	**20.** $9\overline{)45\,657}$
21. $3\overline{)29\,125}$	**22.** $6\overline{)35\,460}$	**23.** $2\overline{)18\,096}$	**24.** $5\overline{)25\,434}$
25. $9\overline{)18\,291}$	**26.** $8\overline{)17\,513}$	**27.** $6\overline{)55\,315}$	**28.** $4\overline{)25\,632}$

Divide. Check your answer.

29. $15\,012 \div 3$ **30.** $49\,002 \div 7$ **31.** $32\,016 \div 4$ **32.** $80\,008 \div 9$

Solve.

33. Mrs. Spencer sold her potatoes in 4 kg bags.
She sold 8036 kg of potatoes for $5.00 per bag.
How many bags did she sell?
How much money did she take in?

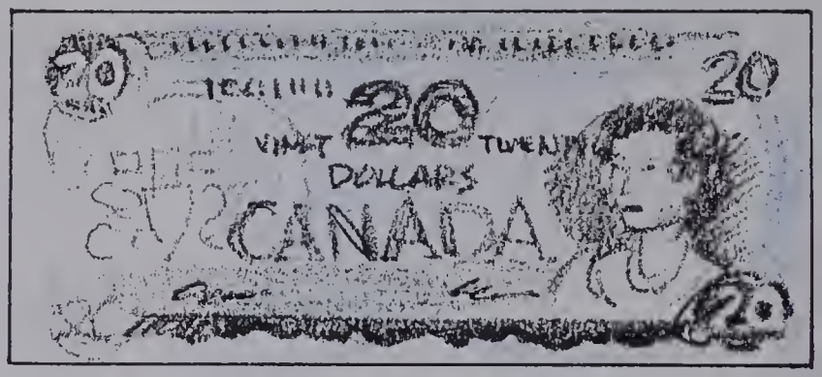
REVIEW

A16	**1.** $17 \div 4$	**2.** $39 \div 4$	**3.** $67 \div 8$	**4.** $89 \div 9$
A17	**5.** $53 \div 3$	**6.** $37 \div 2$	**7.** $480 \div 7$	**8.** $355 \div 8$
A18	**9.** $8\overline{)976}$	**10.** $9\overline{)7064}$	**11.** $4\overline{)8472}$	**12.** $5\overline{)6773}$
A19	**13.** $3\overline{)602}$	**14.** $5\overline{)5112}$	**15.** $4\overline{)4036}$	**16.** $3\overline{)12\,007}$

Dividing by Multiples of Ten

At the end of a market day, Freda cashed the $375 she received in cheques. She wanted as many $20 bills as possible. How many $20 bills could she get?

$375 \div \$20 = \blacksquare$



	Estimate.	Multiply and subtract.	Estimate.	Multiply and subtract.
$20\overline{)375}$	$\begin{array}{r} 1 \\ 20\overline{)375} \end{array}$	$\begin{array}{r} 1 \\ 20\overline{)\ 375} \\ -20 \\ \hline 17 \end{array}$	$\begin{array}{r} 18 \\ 20\overline{)\ 375} \\ -20 \\ \hline 175 \end{array}$	$\begin{array}{r} 18\text{R}15 \\ 20\overline{)\ 375} \\ -20 \\ \hline 175 \\ -160 \\ \hline 15 \end{array}$

She received eighteen $20 bills (and $15 in smaller bills).
Check: $18 \times 20 + 15 = 375$

EXERCISES

Divide.

1. $10\overline{)430}$	**2.** $20\overline{)560}$	**3.** $50\overline{)750}$	**4.** $30\overline{)930}$
5. $40\overline{)938}$	**6.** $30\overline{)684}$	**7.** $60\overline{)795}$	**8.** $50\overline{)538}$
9. $50\overline{)220}$	**10.** $40\overline{)138}$	**11.** $80\overline{)172}$	**12.** $70\overline{)561}$
13. $40\overline{)1608}$	**14.** $50\overline{)3592}$	**15.** $70\overline{)6543}$	**16.** $20\overline{)1267}$

Find the quotient. Check your answer.

17. $3672 \div 80$	**18.** $1446 \div 70$	**19.** $2005 \div 30$	**20.** $3004 \div 50$

PRACTICE

Find the quotient. Check your answer.

1. $10\overline{)530}$	**2.** $20\overline{)640}$	**3.** $30\overline{)690}$	**4.** $50\overline{)950}$
5. $20\overline{)362}$	**6.** $80\overline{)573}$	**7.** $70\overline{)224}$	**8.** $40\overline{)885}$
9. $90\overline{)813}$	**10.** $60\overline{)479}$	**11.** $50\overline{)945}$	**12.** $80\overline{)605}$
13. $30\overline{)1102}$	**14.** $50\overline{)4319}$	**15.** $70\overline{)1029}$	**16.** $90\overline{)4506}$
17. $1758 \div 30$	**18.** $6486 \div 70$	**19.** $4347 \div 60$	**20.** $7956 \div 90$
21. $1130 \div 50$	**22.** $2872 \div 40$	**23.** $2865 \div 80$	**24.** $1345 \div 70$

Copy and complete. Use $<$, $=$, or $>$.

25. $1440 \div 30 \bullet 3840 \div 80$ **26.** $6160 \div 80 \bullet 7020 \div 90$

27. $1850 \div 50 \bullet 1360 \div 40$ **28.** $3640 \div 70 \bullet 3120 \div 60$

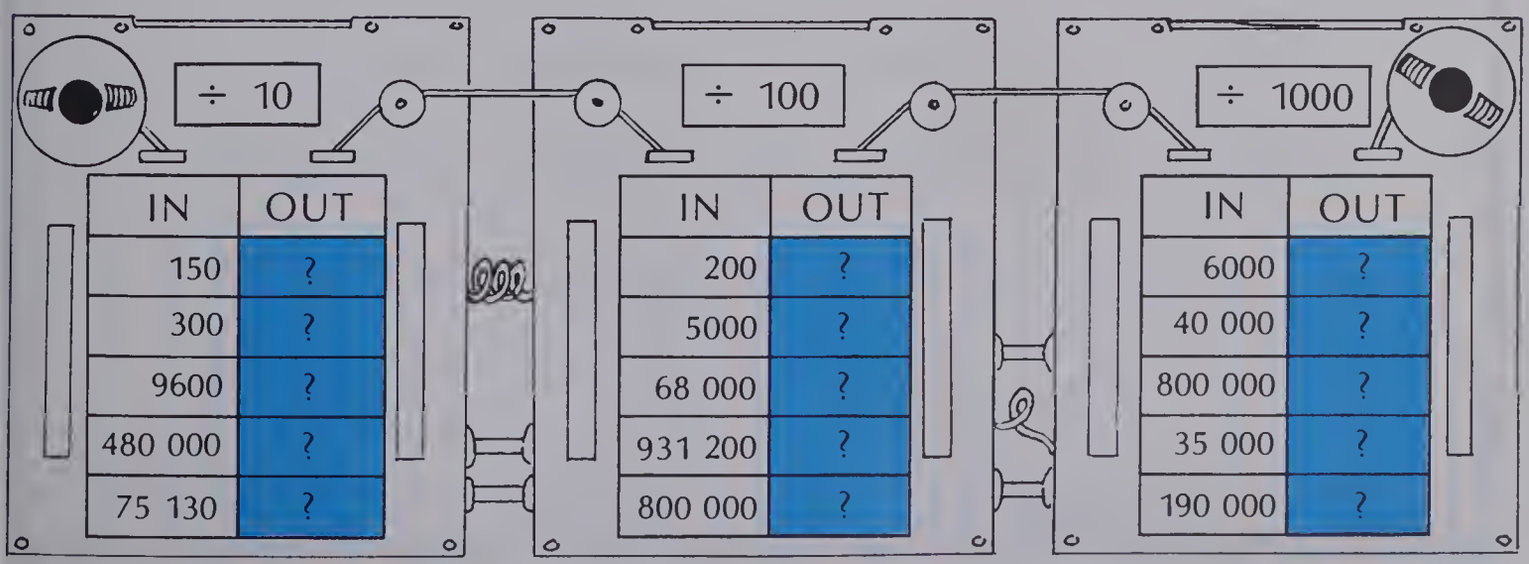
Solve.

29. How many \$20 bills could you receive for a \$1780 cheque?

30. How many \$10 bills could you receive for a \$1000 cheque?

31. How many \$50 bills could you receive for a \$3150 cheque?

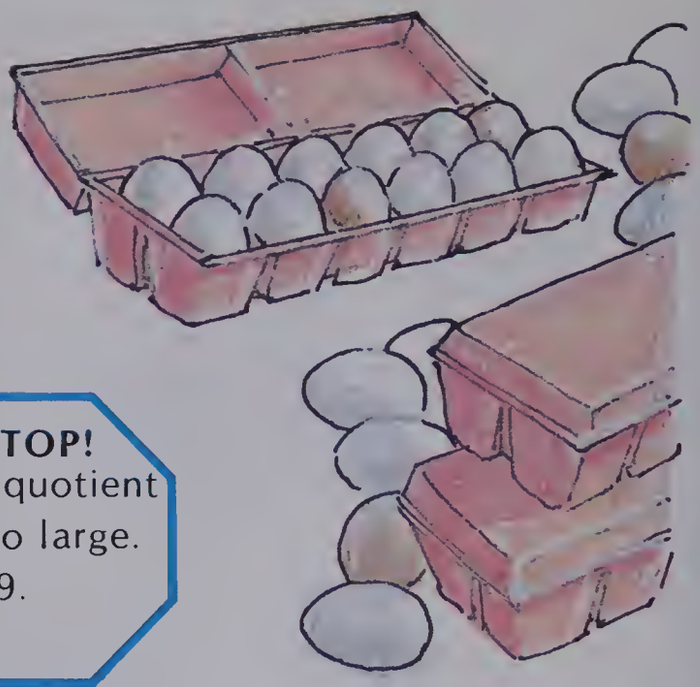
Computer Tutor



Two-Digit Divisors

How many dozen do 110 eggs make?

$110 \div 12 = \blacksquare$



$12\overline{)110}$

Estimate, multiply, and subtract.

$$\begin{array}{r} 10 \\ 12\overline{)\,110} \\ -120 \end{array}$$

STOP! The quotient is too large. Try 9.

Multiply and subtract.

$$\begin{array}{r} 9 \\ 12\overline{)\,110} \\ -108 \\ \hline 2 \end{array}$$

$$\begin{array}{r} 9\text{R}2 \\ 12\overline{)\,110} \\ -108 \\ \hline 2 \end{array}$$

Check:

$$\begin{array}{r} 12 \\ \times\ 9 \\ \hline 108 \\ +\ \ 2 \\ \hline 110 \end{array}$$

110 eggs make 9 dozen. Two eggs are left over.

EXERCISES

Divide.

1. $30\overline{)147}$	**2.** $31\overline{)147}$	**3.** $50\overline{)268}$	**4.** $49\overline{)268}$
5. $70\overline{)324}$	**6.** $72\overline{)324}$	**7.** $60\overline{)538}$	**8.** $55\overline{)538}$
9. $20\overline{)147}$	**10.** $19\overline{)147}$	**11.** $90\overline{)532}$	**12.** $93\overline{)532}$
13. $80\overline{)245}$	**14.** $77\overline{)245}$	**15.** $50\overline{)151}$	**16.** $54\overline{)151}$
17. $11\overline{)106}$	**18.** $63\overline{)528}$	**19.** $45\overline{)300}$	**20.** $59\overline{)472}$

PRACTICE

Find the quotient. Check your answer.

1. $60\overline{)153}$	**2.** $62\overline{)153}$	**3.** $20\overline{)135}$	**4.** $18\overline{)135}$
5. $32\overline{)265}$	**6.** $79\overline{)463}$	**7.** $91\overline{)147}$	**8.** $39\overline{)316}$
9. $75\overline{)412}$	**10.** $68\overline{)507}$	**11.** $28\overline{)129}$	**12.** $59\overline{)432}$
13. $78\overline{)551}$	**14.** $19\overline{)107}$	**15.** $86\overline{)752}$	**16.** $35\overline{)225}$
17. $786 \div 92$	**18.** $531 \div 78$	**19.** $403 \div 51$	**20.** $238 \div 42$
21. $156 \div 25$	**22.** $374 \div 86$	**23.** $419 \div 75$	**24.** $539 \div 94$

For each checking statement, write a corresponding division.

25. $4 \times 22 + 6 = 94$ **26.** $2 \times 46 + 0 = 92$

27. $8 \times 55 + 43 = 483$ **28.** $9 \times 78 + 65 = 767$

Solve.

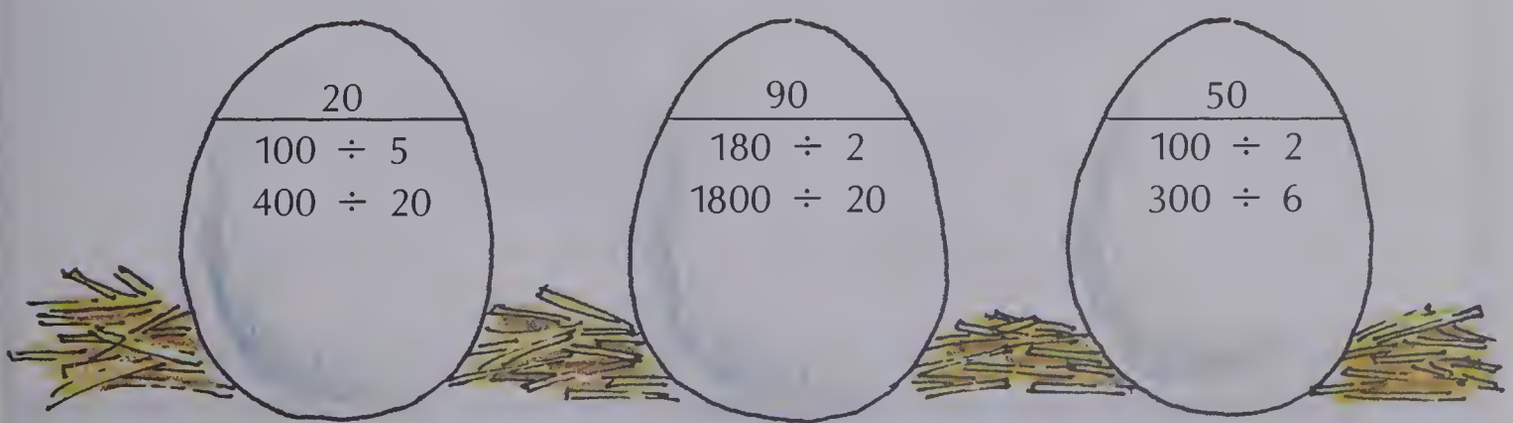
29. How many quarters can you get for 195¢?

30. A butcher sold $405 worth of steaks at the market. If there were 45 kg sold, what was the price per kilogram?

31. For the product 511, one factor is 73. What is the other factor?

Division Names

Can you find 10 division names for 20, 90, and 50?
Study the examples.



Two-Digit Divisors

For the farmers' banquet and dance that was held after the harvest, $1008 was collected. If the tickets for each couple were $18, how many couples attended the banquet and dance?

$18\overline{)1008}$

Estimate, multiply, and subtract.

$$\begin{array}{r} 5 \\ 18\overline{)\,1008} \\ -90 \\ \hline 108 \end{array}$$

Estimate, multiply and subtract.

$$\begin{array}{r} 56 \\ 18\overline{)\,1008} \\ -90 \\ \hline 108 \\ -108 \\ \hline \end{array}$$

Check:

$$\begin{array}{r} 56 \\ \times\ 18 \\ \hline 448 \\ 56 \\ \hline 1008 \end{array}$$

56 couples attended the banquet and dance.

EXERCISES

Tell what is wrong with the first division.
Complete the second division.

1. $\begin{array}{r} 7 \\ 34\overline{)\,2210} \\ -238 \\ \hline \end{array}$ $34\overline{)2210}$

2. $\begin{array}{r} 7 \\ 23\overline{)\,1518} \\ -161 \\ \hline \end{array}$ $23\overline{)1518}$

3. $\begin{array}{r} 6 \\ 54\overline{)\,3024} \\ -324 \\ \hline \end{array}$ $54\overline{)3024}$

4. $\begin{array}{r} 6 \\ 85\overline{)\,6290} \\ -510 \\ \hline \end{array}$ $85\overline{)6290}$

Divide.

5. $43\overline{)502}$
6. $55\overline{)785}$
7. $32\overline{)697}$
8. $29\overline{)986}$
9. $44\overline{)3456}$
10. $57\overline{)3363}$
11. $68\overline{)6778}$
12. $79\overline{)6636}$

PRACTICE

Find the quotient. Check your answer.

1. $12\overline{)625}$	**2.** $24\overline{)696}$	**3.** $37\overline{)721}$	**4.** $43\overline{)817}$
5. $15\overline{)1003}$	**6.** $27\overline{)2134}$	**7.** $34\overline{)3000}$	**8.** $46\overline{)4321}$
9. $95\overline{)8900}$	**10.** $69\overline{)5238}$	**11.** $16\overline{)1425}$	**12.** $23\overline{)2003}$
13. $78\overline{)6325}$	**14.** $49\overline{)3149}$	**15.** $67\overline{)2245}$	**16.** $83\overline{)7061}$
17. $99\overline{)4532}$	**18.** $75\overline{)6009}$	**19.** $24\overline{)1326}$	**20.** $35\overline{)2605}$
21. $5678 \div 64$	**22.** $5000 \div 51$	**23.** $936 \div 78$	**24.** $2832 \div 59$

Copy and complete. Use $=$ or $\neq$.

25. $416 \div 32 \bullet 975 \div 75$ **26.** $289 \div 17 \bullet 666 \div 37$

27. $1246 \div 89 \bullet 336 \div 24$ **28.** $583 \div 53 \bullet 552 \div 46$

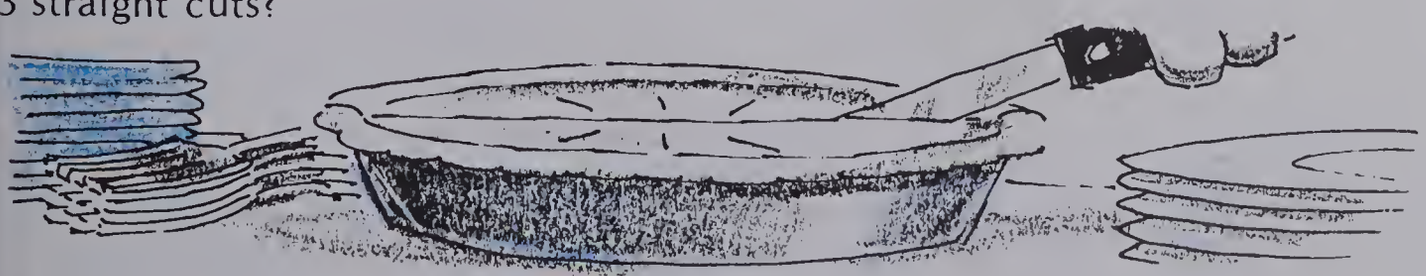
Solve.

29. $6000 is shared by 75 people. How much does each person get?

30. 675 kg of potatoes are put into 45 sacks. How many kilograms does each sack hold?

Cutting the Pie

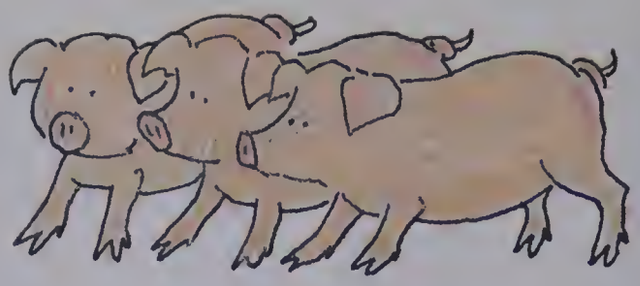
What is the greatest number of pieces you could cut this pie into with 3 straight cuts?



Draw several circles and try a few different ways.

Try to cut a pie into 11 pieces with 4 straight cuts.

Two-Digit Divisors



The Harrisons sold 38 of their pigs for $4674. What was the price of each pig?

$4674 \div 38 = \blacksquare$

Estimate, multiply, and subtract.

Estimate, multiply and subtract.

Estimate, multiply and subtract.

$$\begin{array}{r} 38\overline{)4674} \end{array}$$

$$\begin{array}{r} 1 \\ 38\overline{)4674} \\ -38 \\ \hline 8 \end{array}$$

$$\begin{array}{r} 12 \\ 38\overline{)4674} \\ -38 \\ \hline 87 \\ -76 \\ \hline 11 \end{array}$$

$$\begin{array}{r} 123 \\ 38\overline{)4674} \\ -38 \\ \hline 87 \\ -76 \\ \hline 114 \\ -114 \\ \hline \end{array}$$

The price of each pig was $123.

EXERCISES

Copy and complete each division.

1. $\begin{array}{r} 2 \\ 13\overline{)2879} \\ -26 \\ \hline 27 \end{array}$

2. $\begin{array}{r} 3 \\ 24\overline{)8544} \\ -72 \\ \hline 134 \end{array}$

3. $\begin{array}{r} 2 \\ 33\overline{)7891} \\ -66 \\ \hline 12 \end{array}$

4. $\begin{array}{r} 1 \\ 57\overline{)9000} \\ -57 \\ \hline 33 \end{array}$

5. $\begin{array}{r} 7 \\ 13\overline{)10\,058} \\ -\ 9\ 1 \\ \hline 95 \end{array}$

6. $\begin{array}{r} 8 \\ 34\overline{)29\,376} \\ -27\ 2 \\ \hline 2\ 17 \end{array}$

7. $\begin{array}{r} 9 \\ 47\overline{)43\,215} \\ -42\ 3 \\ \hline 9 \end{array}$

8. $\begin{array}{r} 8 \\ 58\overline{)52\,026} \\ -46\ 4 \\ \hline 5\ 6 \end{array}$

Divide.

9. $\begin{array}{r} 2 \\ 21\overline{)4471} \end{array}$

10. $53\overline{)8692}$

11. $26\overline{)8947}$

12. $76\overline{)9576}$

13. $\begin{array}{r} 2 \\ 43\overline{)11\,094} \end{array}$

14. $55\overline{)40\,000}$

15. $67\overline{)55\,439}$

16. $78\overline{)53\,586}$

PRACTICE

Find the quotient. Check your answer.

1. $15\overline{)1875}$	**2.** $23\overline{)3082}$	**3.** $34\overline{)7324}$	**4.** $46\overline{)9123}$
5. $16\overline{)3744}$	**6.** $24\overline{)9825}$	**7.** $36\overline{)8317}$	**8.** $59\overline{)9617}$
9. $54\overline{)36\,612}$	**10.** $63\overline{)42\,777}$	**11.** $78\overline{)75\,579}$	**12.** $88\overline{)45\,678}$
13. $65\overline{)8715}$	**14.** $77\overline{)75\,000}$	**15.** $53\overline{)8639}$	**16.** $91\overline{)81\,354}$

For each checking statement, write a corresponding division.

17. $37 \times 17 + 7 = 636$ **18.** $268 \times 34 + 0 = 9112$

19. $768 \times 45 + 8 = 34\,568$ **20.** $874 \times 69 + 53 = 60\,359$

Round the divisor and dividend.
Estimate the quotient.

21. $28\overline{)6194}$	**22.** $62\overline{)7578}$	**23.** $49\overline{)9957}$	**24.** $19\overline{)8564}$

Solve.

25. If the dividend is 3400 and the divisor is 25, what is the quotient?

26. If the product is 19 845 and one factor is 21, what is the other factor?

Using Your Head

Complete these equations without paper and pencil.

a. $(852 \div 1) \times 1 = \blacksquare$

b. $(97 \div 97) \times 145 = \blacksquare$

c. $(7643 \div 1) \times 0 = \blacksquare$

d. $(348 - 348) \times 1 = \blacksquare$

e. $(150 + 150) \div 1 = \blacksquare$

f. $(573 - 573) \times 573 = \blacksquare$

Two-Digit Divisors

A farmer made $22 500 in one year.
How much is that per month?

$22 500 ÷ 12 = ■

```
      1
12) 22 500
   -12
    10 5
```

```
      1 8
12) 22 500
   -12
    10 5
   - 9 6
       90
```

```
      1 87
12) 22 500
   -12
    10 5
   - 9 6
       90
      -84
        60
```

```
      1 875
12) 22 500
   -12
    10 5
   - 9 6
       90
      -84
        60
       -60
```

Check:

```
  1875
×   12
 3 750
18 75
22 500
```

The farmer made $1875 per month.

EXERCISES

Copy and complete each division.

1. 19) 46 125 (2 4)
   -38
   8 1
   -7 6
   52

2. 58) 97 482 (1 6)
   -58
   39 4
   -34 8
   4 68

3. 31) 79 453 (2 5)
   -62
   17 4
   -15 5
   1 95

4. 66) 94 000 (1 4)
   -66
   28 0
   -26 4
   1 60

5. 45) 51 234 (1)
   -45
   6 2

6. 53) 64 583 (1)
   -53
   11 5

7. 28) 94 640 (3)
   -84
   10 6

8. 18) 80 000 (4)
   -72
   8 0

9. 38) 85 172

10. 37) 96 132

11. 14) 38 657

12. 21) 67 430

13. 79) 79 657

14. 38) 76 867

15. 55) 55 103

16. 82) 82 147

PRACTICE

Find the quotient. Check your answer.

1. $13\overline{)16\,042}$ **2.** $24\overline{)56\,544}$ **3.** $32\overline{)82\,048}$ **4.** $46\overline{)89\,976}$

5. $58\overline{)93\,032}$ **6.** $91\overline{)99\,736}$ **7.** $47\overline{)94\,094}$ **8.** $56\overline{)80\,136}$

9. $16\overline{)20\,521}$ **10.** $25\overline{)44\,365}$ **11.** $33\overline{)75\,319}$ **12.** $47\overline{)63\,918}$

For each checking statement, write a corresponding division.

13. $2036 \times 15 + 0 = 30\,540$ **14.** $3456 \times 28 + 6 = 96\,774$

15. $2012 \times 46 + 3 = 92\,555$ **16.** $1309 \times 69 + 9 = 90\,330$

Round the divisor and dividend.
Estimate the quotient.

17. $51\overline{)57\,214}$ **18.** $71\overline{)23\,576}$ **19.** $21\overline{)83\,465}$ **20.** $98\overline{)40\,621}$

21. Copy and complete the table.

Yearly salary	How much per month?	How much per week?
\$ 50 000		
\$100 000		
\$ 18 000		

USING THE CALCULATOR

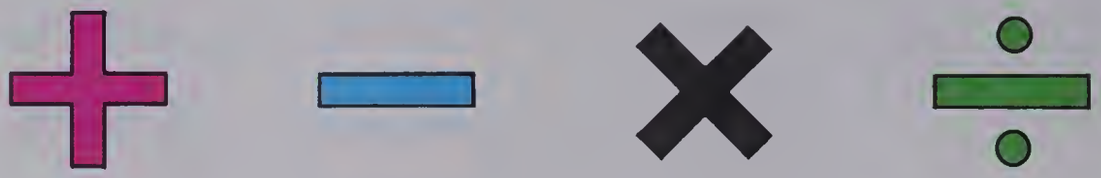
Divide with a calculator.
Round to the nearest whole number.

a. 2 347 108 ÷ 576 **b.** 58 104 379 ÷ 4792

c. 546 374 ÷ 43 **d.** 975 198 ÷ 113

Problem Solving Quiz

Try this quiz. Name the operation that gives the correct answer.



1. If a woman buys 12 baskets of apples for $54, how much does each basket cost?
   a. $54 + 12 **b.** $54 − 12 **c.** $54 × 12 **d.** $54 ÷ 12

2. A man buys 5 jugs of maple syrup at $6 a jug. How much does he pay?
   a. $6 + 5 **b.** $6 − 5 **c.** $6 × 5 **d.** $6 ÷ 5

3. Jane had $49 in her wallet after she spent $15 on meat. How much did she have at first?
   a. $49 + $15 **b.** $49 − $15 **c.** $49 × $15 **d.** $49 ÷ $15

4. A farmers' market sold 6350 kg of potatoes in 10 kg bags. How many bags did they sell altogether?
   a. 6350 + 10 **b.** 6350 − 10 **c.** 6350 × 10 **d.** 6350 ÷ 10

5. Peter had $32 in his wallet. He then spent $25 on groceries. How much was left?
   a. $32 + $25 **b.** $32 − $25 **c.** $32 × $25 **d.** $32 ÷ $25

6. The parking lot at the market has 52 rows with space for 25 cars in each row. How many spaces are there altogether?
   a. 52 + 25 **b.** 52 − 25 **c.** 52 × 25 **d.** 52 ÷ 25

7. If 3007 sales of sweet corn were made at the market during the month of July, what was the average number of sales per day?
   a. 3007 + 31 **b.** 3007 − 31 **c.** 3007 × 31 **d.** 3007 ÷ 31

8. Mrs. Lorenz sold 243 bags of radishes last Saturday. This Saturday she sold 178. How many were sold altogether?
   a. 243 + 178 **b.** 243 − 178 **c.** 243 × 178 **d.** 243 ÷ 178

PRACTICE

Solve.

1. Mary earned $12 a week for babysitting. How much did she earn after 15 weeks?

2. There have been 72 school days since school started. There are 128 school days left in the year. How many school days are there in one school year?

3. There are 50 000 seats in a football stadium. The stadium has 25 sections — all the same size. How many seats are in each section?

4. Mr. Thompson borrowed $60 000 from the bank. So far, he has paid $25 275 back. How much has he left to repay?

5. If the product is 17 628 and one factor is 26, what is the other factor?

6. Laura Mishko sold her crop of tomatoes for $14 640. She got $48 for every 100 kg of tomatoes. What was the mass of her whole crop?

REVIEW

A20 Divide.

1. $30\overline{)147}$ 2. $20\overline{)972}$ 3. $50\overline{)3000}$ 4. $60\overline{)1754}$

A21

5. $31\overline{)147}$ 6. $62\overline{)452}$ 7. $29\overline{)113}$ 8. $91\overline{)516}$

A22

9. $21\overline{)436}$ 10. $57\overline{)894}$ 11. $33\overline{)2612}$ 12. $25\overline{)1950}$

A23

13. $41\overline{)9651}$ 14. $69\overline{)7524}$ 15. $52\overline{)47\,034}$ 16. $89\overline{)30\,705}$

A24

17. $32\overline{)32\,032}$ 18. $15\overline{)45\,150}$ 19. $78\overline{)86\,424}$ 20. $54\overline{)86\,921}$

TEST UNIT 4

Find the quotient.

1. $48 \div 5$	**2.** $37 \div 8$	**3.** $74 \div 9$	**4.** $16 \div 3$
5. $73 \div 4$	**6.** $87 \div 3$	**7.** $191 \div 5$	**8.** $603 \div 9$
9. $456 \div 2$	**10.** $750 \div 5$	**11.** $3429 \div 9$	**12.** $6412 \div 3$

13. $2\overline{)4016}$	**14.** $7\overline{)2803}$	**15.** $9\overline{)80\,010}$
16. $20\overline{)163}$	**17.** $30\overline{)920}$	**18.** $80\overline{)6015}$
19. $18\overline{)102}$	**20.** $39\overline{)145}$	**21.** $63\overline{)378}$
22. $51\overline{)956}$	**23.** $78\overline{)1170}$	**24.** $45\overline{)1062}$
25. $63\overline{)7875}$	**26.** $38\overline{)4332}$	**27.** $82\overline{)9549}$
28. $19\overline{)19\,076}$	**29.** $18\overline{)36\,576}$	**30.** $31\overline{)33\,449}$

Solve.

31. If the dividend is 1139 and the divisor is 68, what is the quotient?

32. Patrick and his two friends sold their old toys and books. They made $57. How much would Patrick get if they shared the money equally?

33. Nine airplanes filled to capacity carried 1350 passengers to Toronto. All planes were the same size. How many passengers were there per plane?

34. A survey was to be made of the customers at the farmers' market. Six teenagers were hired to interview 2250 customers. About how many people must each teenager interview?

LOOKING BACK

MULTIPLICATION

Find the product.

1. 213 × 3	**2.** 237 × 4	**3.** 609 × 8	**4.** 2171 × 6
5. 34 × 13	**6.** 17 × 25	**7.** 39 × 81	**8.** 146 × 25
9. 298 × 152	**10.** 605 × 556	**11.** 891 × 317	**12.** 899 × 485
13. 275 × 800	**14.** 973 × 260	**15.** 594 × 306	**16.** 208 × 905

Calculate.

17. 6^2	**18.** 10^3	**19.** 2^4	**20.** 8^1
21. 2^5	**22.** 3^2	**23.** 5^3	**24.** 10^4

25. $1000 = 10^{\blacksquare}$ **26.** $200 = 2 \times 10^{\blacksquare}$ **27.** $80\,000 = \blacksquare \times 10^{\blacksquare}$

Multiply.

28. 8¢ × 3	**29.** \$0.16 × 8	**30.** \$1.07 × 32	**31.** \$3.95 × 78
32. 5.6 × 2	**33.** 22 × 3.5	**34.** 25.3 × 641	**35.** 384 × 20.9
36. 3.45 × 4	**37.** 83 × 0.49	**38.** 4.05 × 256	**39.** 154 × 9.08

Estimate the product.

40. 709 × 58 **41.** 87 × 3.2 **42.** \$6.25 × 75

UNIT 5

MEASUREMENT

Metric Symbols

Prefix	Symbol	Meaning
kilo	k	1000
hecto	h	100
deca	da	10
deci	d	0.1
centi	c	0.01
milli	m	0.001

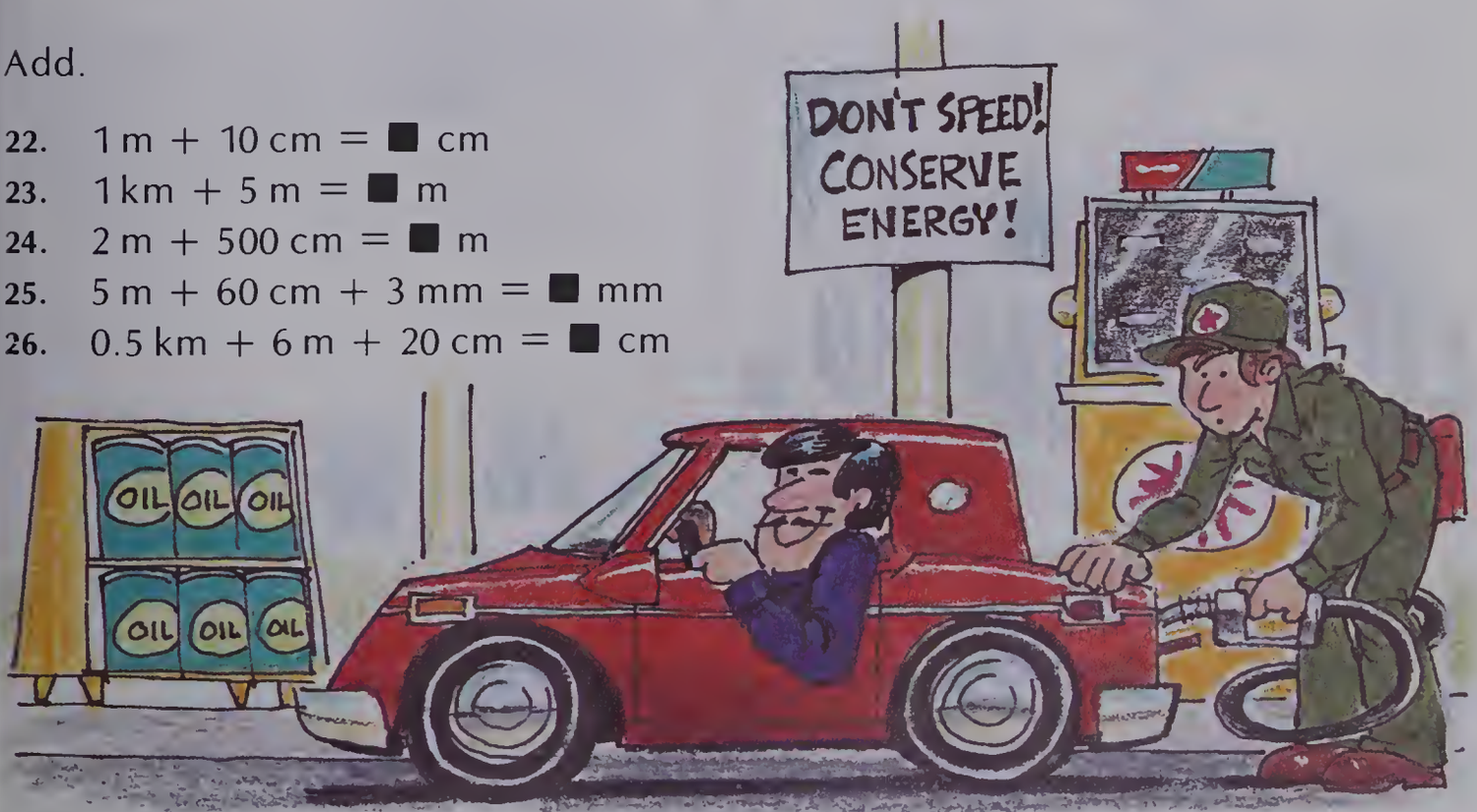
Length Unit	Symbol
kilometre	km
hectometre	hm
decametre	dam
metre	m
decimetre	dm
centimetre	cm
millimetre	mm

Copy and complete.
Check that your answers are reasonable.

1. 1 m = ■ cm
2. 1 m = ■ mm
3. 1 m = ■ dm
4. 1 km = ■ m
5. 1 km = ■ cm
6. 1 km = ■ mm
7. 10 mm = ■ cm
8. 20 mm = ■ cm
9. 50 mm = ■ cm
10. 1 cm = ■ mm
11. 4 cm = ■ mm
12. 1 mm = ■ cm
13. 100 cm = ■ m
14. 200 cm = ■ m
15. 600 cm = ■ m
16. 1000 m = ■ km
17. 3000 m = ■ km
18. 4000 m = ■ km
19. 1 m = ■ km
20. 5 m = ■ km
21. 500 m = ■ km

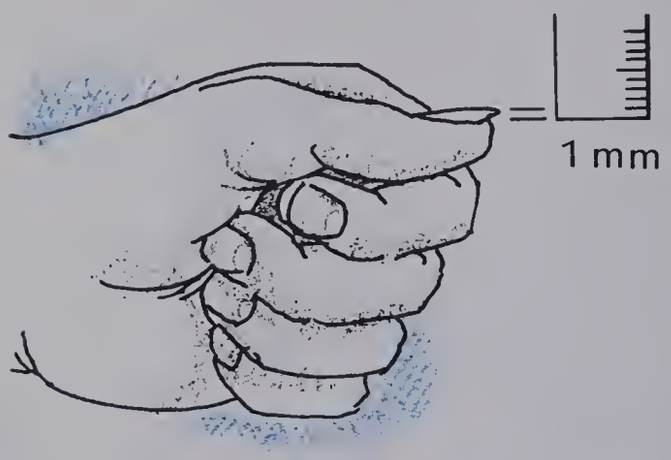
Add.

22. 1 m + 10 cm = ■ cm
23. 1 km + 5 m = ■ m
24. 2 m + 500 cm = ■ m
25. 5 m + 60 cm + 3 mm = ■ mm
26. 0.5 km + 6 m + 20 cm = ■ cm

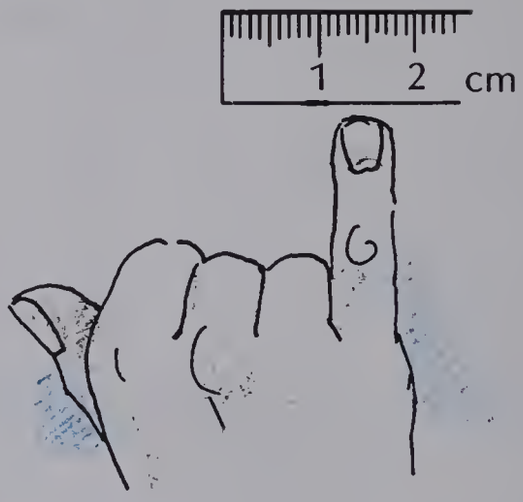


Appropriate Length Units

A **millimetre** is about the thickness of a thumbnail.



A **centimetre** is about the width of a finger.



A **metre** is about the height of a door knob.

A **kilometre** is about an eight minute walk.

EXERCISES

Write the symbol for the most appropriate unit to measure each.

1. length of an arm
2. width of a stamp
3. football field
4. distance between towns
5. length of a pencil
6. width of nickel
7. thickness of a dime
8. length of a city block
9. length of a river
10. width of a river
11. height of a pole
12. thickness of a string

PRACTICE

Match with the most appropriate length.

1. height of a tall building
2. thickness of a book cover
3. distance across Canada
4. length of a car
5. height of a telephone pole
6. height of one-litre oil can
7. thickness of a credit card
8. height of a kitchen stove
9. distance across a small city
10. height of a gas pump

a.	5 km
b.	15 cm
c.	150 m
d.	1 m
e.	1 mm
f.	10 m
g.	5000 km
h.	2 mm
i.	1.5 m
j.	4 m

Estimate in centimetres. Check each estimate by measuring.

11. width of your foot
12. width of your fist
13. length of your thumb
14. length of your pen
15. length of this book
16. width of this book

Estimation

1 cm

Estimate each length. Check by measuring.

1.

2.

3.

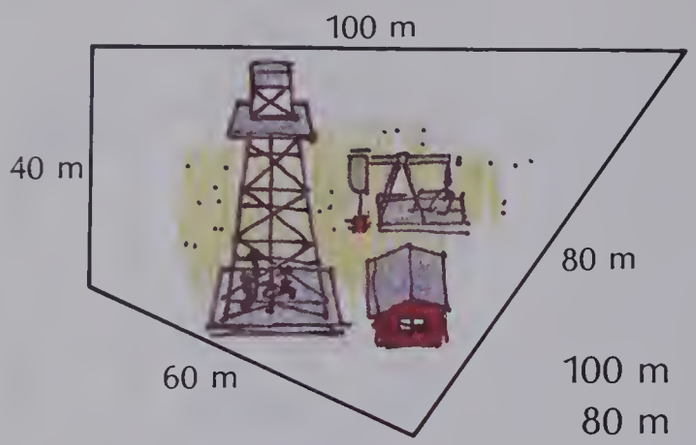
4.

5.

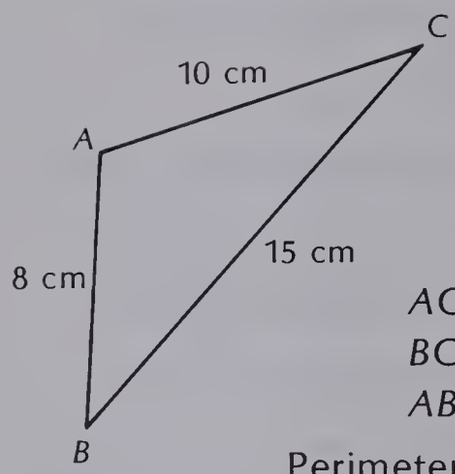
6.

Perimeter

The **perimeter** of a polygon is the sum of the lengths of its sides.



100 m
80 m
60 m
40 m
Perimeter = 280 m

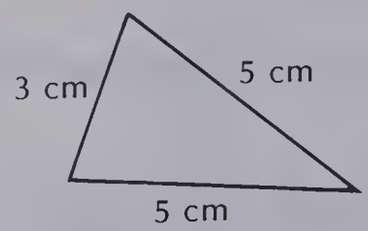


AC = 10 cm
BC = 15 cm
AB = 8 cm
Perimeter = 33 cm

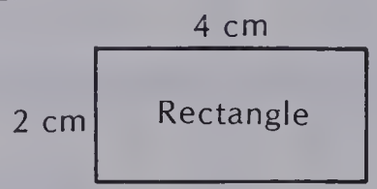
EXERCISES

What is the perimeter?

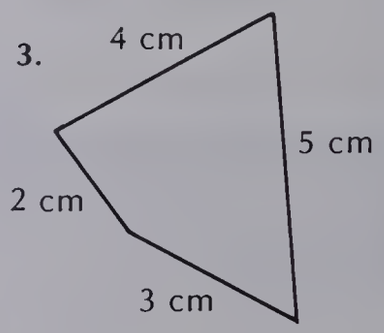
1.



2.



3.



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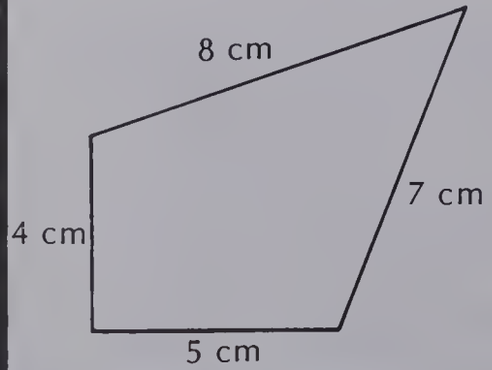
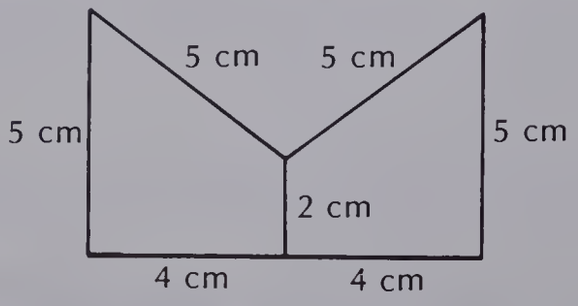


5.



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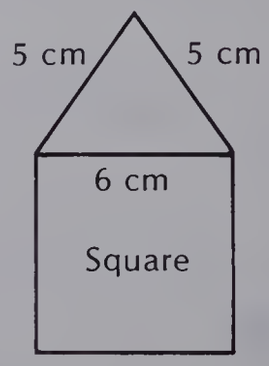
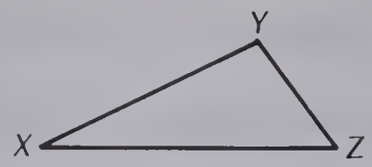


PRACTICE

Find the perimeter of triangle XYZ.



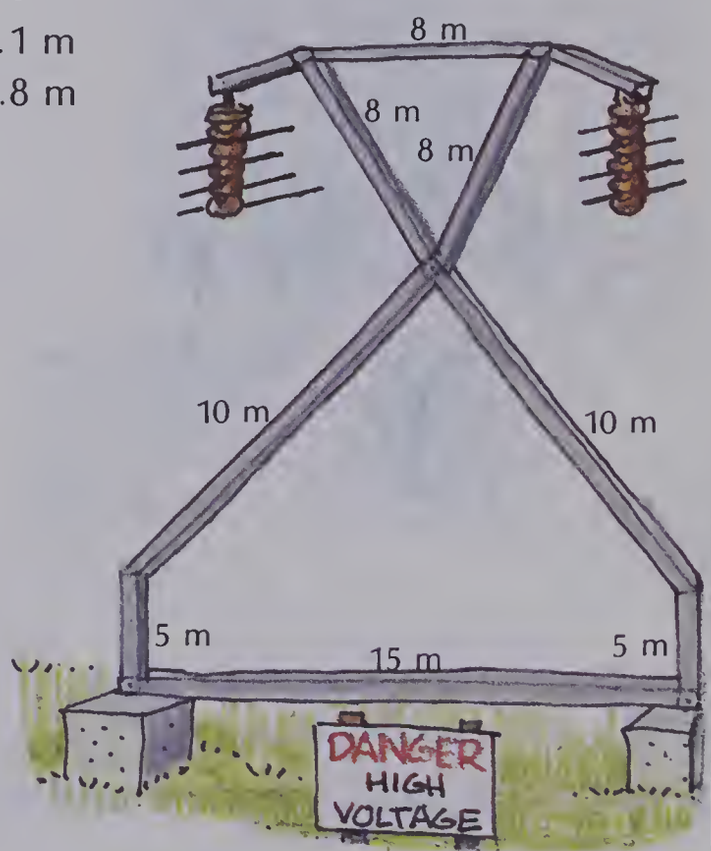
1. $YZ = 6$ cm, $XZ = 5$ cm, $XY = 3$ cm
2. $YZ = 31$ km, $XZ = 27$ km, $XY = 17$ km
3. $YZ = 11$ m, $XZ = 9$ m, $XY = 5$ m
4. $YZ = 60$ mm, $XZ = 48$ mm, $XY = 31$ mm
5. $YZ = 1.6$ m, $XZ = 1.1$ m, $XY = 0.8$ m

What is the perimeter of a polygon with these sides?

6. 4 cm, 6 cm, 3 cm, 1 cm
7. 4.5 m, 3.4 m, 5.6 m
8. 3 m, 2 m, 75 cm
9. 4 cm, 9 mm, 4 cm

Solve.

10. What is the perimeter of the triangle at the top of the structure?
11. What is the perimeter of the pentagon at the bottom of the structure?

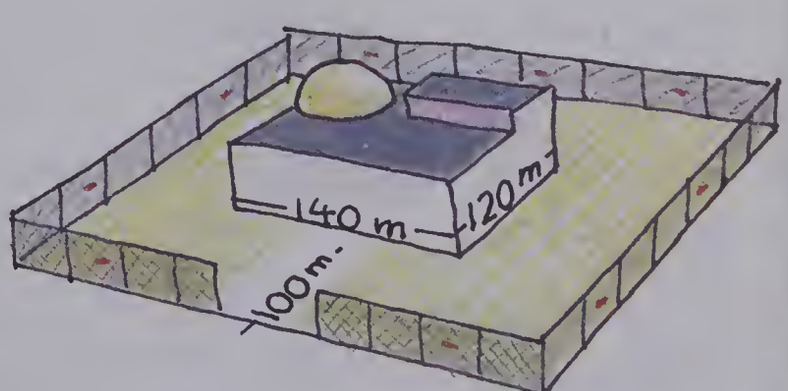


Fenced In

A nuclear power plant measures 120 m by 140 m.

The fence around it is 100 m from the outside walls.

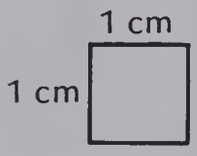
How long is the fence?



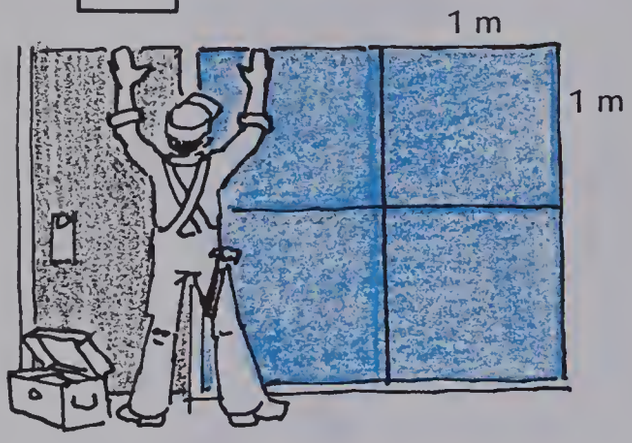
Area

The **area** of a figure is the measure of the surface it covers.

Area can be measured in **square metres (m^2)** or in **square centimetres (cm^2)**.



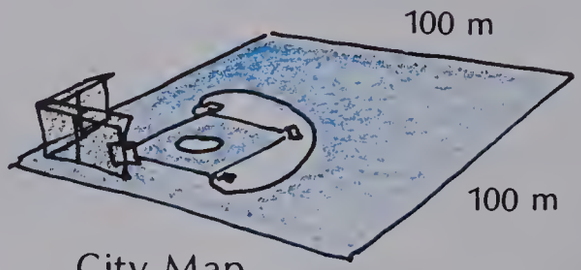
1 cm^2 (one square centimetre)



Each insulation panel is **1 m^2** (one square metre).

Large areas, like fields, are measured in **hectares (ha)**.

1 ha = 10 000 m^2



City Map

Very large areas, like whole cities or countries, are measured in **square kilometres (km^2)**.

EXERCISES

Write the most appropriate unit for measuring each area.

1. a sheet of writing paper
2. classroom floor
3. surface of a tennis court
4. a pizza
5. Canada
6. a bookshelf
7. hockey rink
8. a field
9. city park
10. the Great Lakes

PRACTICE

Copy and complete each sentence using the most appropriate unit for the area.

1. A page in this math book is about 600 ■.
2. A baseball park is about 1 ■.
3. A football field is about 6000 ■.
4. Prince Edward Island is about 5600 ■.
5. A city park is about 10 ■.
6. A postage stamp is about 5 ■.
7. Canada is about 10 000 000 ■.
8. A large pizza is about 1200 ■.
9. A basketball court is about 600 ■.
10. A credit card is about 50 ■.
11. A hockey rink is about 1600 ■.
12. Quebec is about 1 500 000 ■.

Copy and complete using $<$, $>$, or $=$.

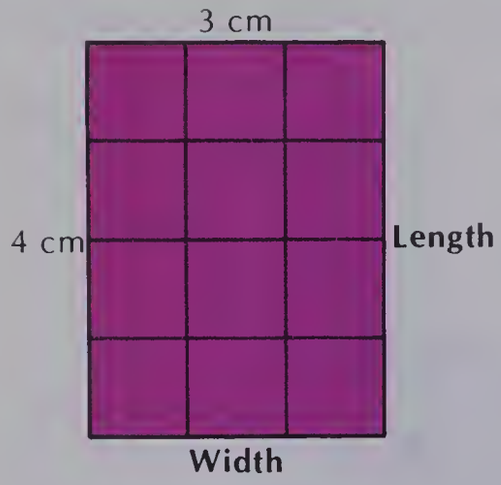
13. 1 ha ● 1 km^2
14. 1 km^2 ● 10 ha
15. 100 cm^2 ● 1 m^2
16. 1 m^2 ● 1000 cm^2
17. 2 ha ● 10 000 cm^2
18. 1 m^2 ● 10 000 cm^2
19. 1 ha ● 10 000 m^2
20. 1 km^2 ● 1000 ha
21. 1 km^2 ● 100 ha

Provincial Areas

1. List the provinces in order by area from smallest to largest.
2. What is the total area of the Prairie Provinces?
3. What is the total area of the Maritime Provinces?
4. About how much larger is Quebec than Prince Edward Island?

Province	Area (km^2)
Newfoundland	404 517
Prince Edward Island	5 657
Nova Scotia	55 491
New Brunswick	73 436
Quebec	1 540 680
Ontario	1 068 582
Manitoba	650 087
Saskatchewan	651 900
Alberta	661 185
British Columbia	948 596

Area Formulas



By counting squares:

Area = 12 cm²

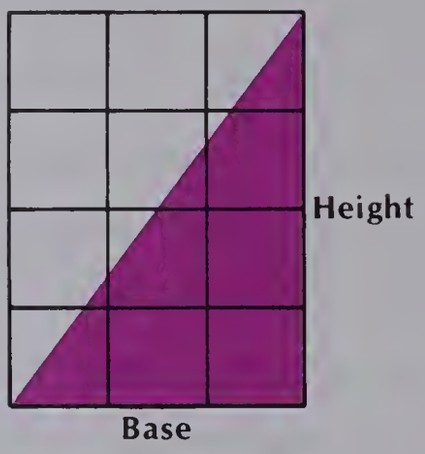
There are 4 rows of 3 squares.

$4 \times 3 = 12$

For any rectangle:

Area = Length × Width

or $A = L \times W$



The area of the triangle is half the area of the rectangle.

$$\text{Area} = \frac{12}{2}\ \text{cm}^2 = 6\ \text{cm}^2$$

For any triangle:

$$\text{Area} = \frac{\text{Base} \times \text{Height}}{2}$$

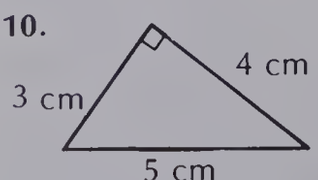
or $$A = \frac{B \times H}{2}$$

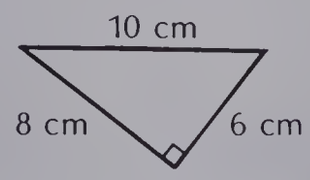
EXERCISES

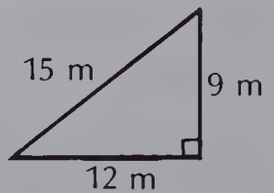
What is the area of a rectangle with the following measurements?

1. Length = 5 cm
   Width = 4 cm
2. L = 28 cm
   W = 30 cm
3. L = 20 m
   W = 15 m

What is the area of a triangle with the following measurements?

4. Base = 5 cm
   Height = 4 cm
5. B = 15 cm
   H = 10 cm
6. B = 36 m
   H = 12 m
7. B = 24 km
   H = 18 km
8. B = 16 m
   H = 20 m
9. B = 25 cm
   H = 30 cm
10. 

11. 

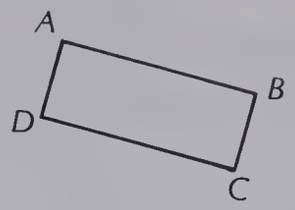
12. 

PRACTICE

What is the area of rectangle *ABCD*?

1. $DC = 8$ cm
   $BC = 20$ cm

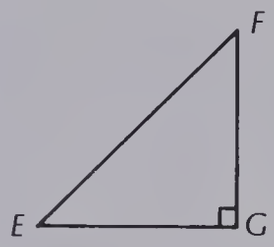
2. $BC = 8$ m
   $DC = 55$ m
   $AB = 55$ m



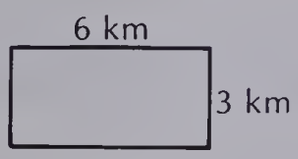
What is the area of triangle *EFG*?

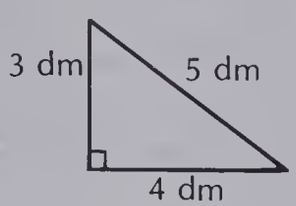
3. $EG = 8$ cm
   $FG = 6$ cm
   $EF = 10$ cm

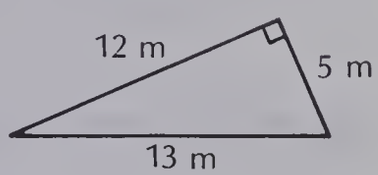
4. $EG = 15$ cm
   $FG = 10$ m

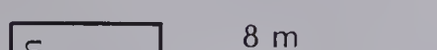


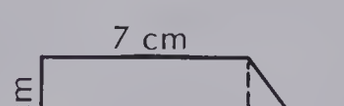
Calculate each area.

5. 

6. 

7. 

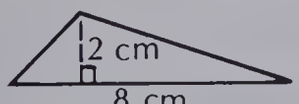
8. 

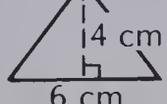
9. 

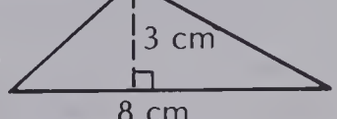
10.

11. a. What is the area of triangle *STV*?
    b. What is the area of triangle *TVR*?
    c. What is their total area?
    d. What is the area of triangle *STR*?
    e. Is there another way to find the area of triangle *STR*?

Calculate each area.

12. 

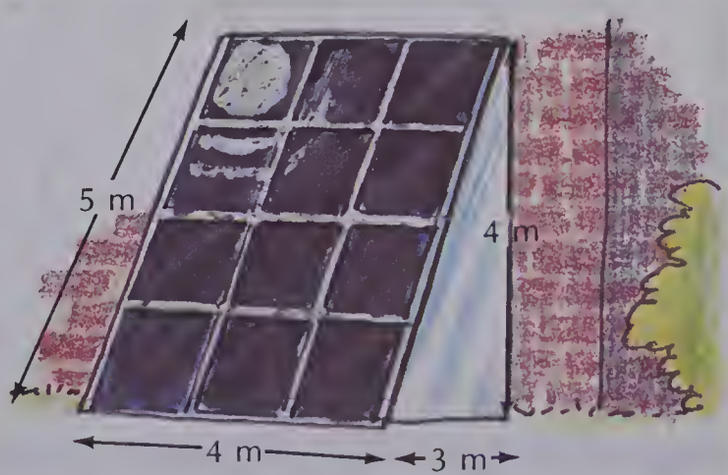
13. 

14. 

Solar Panels

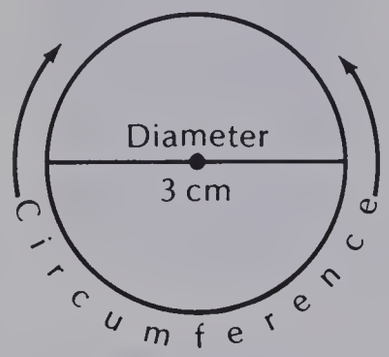
1. What is the total area of the solar panel?

2. What is the area of the triangular support for the panel?

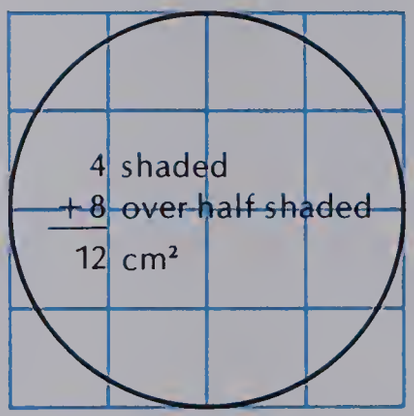


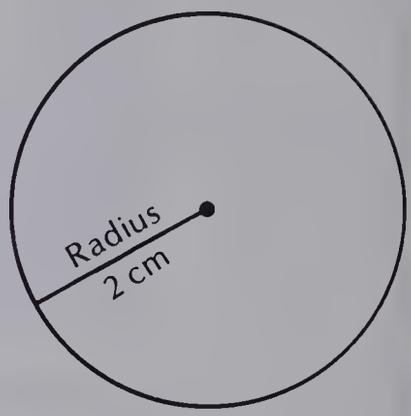
Measuring Circles

The **circumference** is the distance around a circle.



The **area** of a circle can be estimated by counting squares.



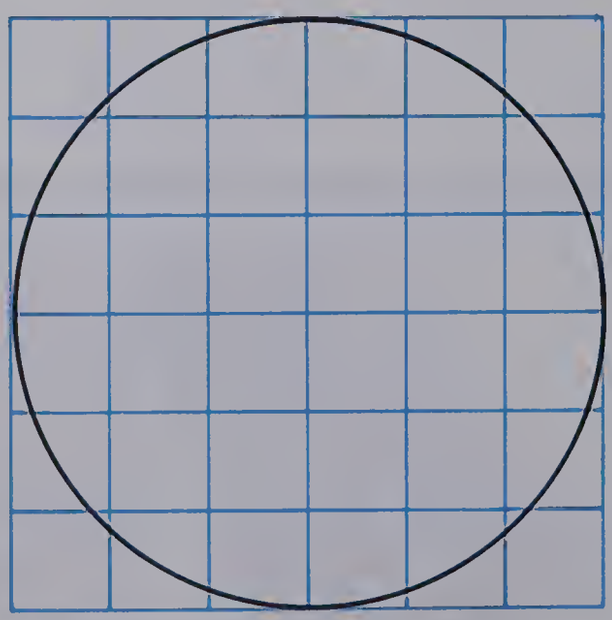


Circumference = Diameter × 3.14
= 3 × 3.14
= 9.42
The circumference is 9.42 cm.

Area = (Radius)² × 3.14
= 2 × 2 × 3.14
= 12.56
The area is 12.56 cm².

3.14 is the approximate value of a special number called **pi**.

EXERCISES



1. Estimate the area by counting squares.
2. What is the radius?
3. Calculate the area.
4. What is the diameter?
5. Calculate the circumference.

PRACTICE

Calculate the circumference of a circle with each diameter.

1.	11 cm	**2.**	25 cm	**3.**	22 cm	**4.**	40 cm	**5.**	300 cm
6.	12 m	**7.**	20 mm	**8.**	35 km	**9.**	42 dm	**10.**	63 cm

Calculate the area of a circle with each radius.

11.	6 cm	**12.**	7 m	**13.**	10 m	**14.**	22 cm	**15.**	15 cm
16.	12 m	**17.**	16 m	**18.**	30 m	**19.**	5 km	**20.**	23 cm

Solve.

21. What is the area of a circle with a diameter of 10 cm?

22. What is the circumference of a circle with a radius of 15 cm?

23. What is the diameter of a circle with a circumference of 628 cm?

REVIEW

M4

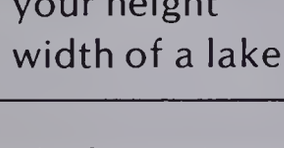
Which unit of length is most appropriate?

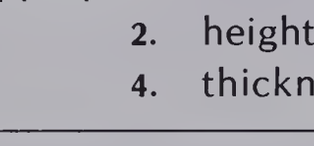
1. your height **2.** height of a mountain

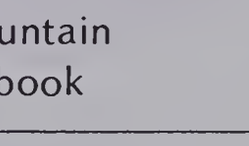
3. width of a lake **4.** thickness of a book

M5

What is the perimeter?

5. 

6. 

7. 

M6

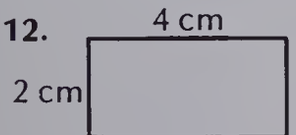
Which unit of area is most appropriate?

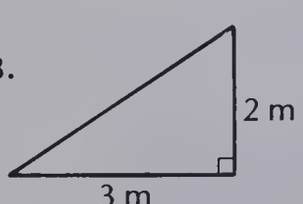
8. size of a farm **9.** floor space at home

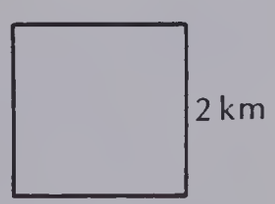
10. the Maritime Provinces **11.** your footprint

M7

What is the area?

12. 

13. 

14. 

M8

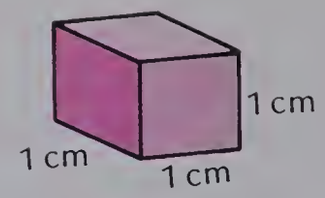
15. What is the circumference of a circle with a diameter of 2 cm?

16. What is the area of a circle with a radius of 4 m?

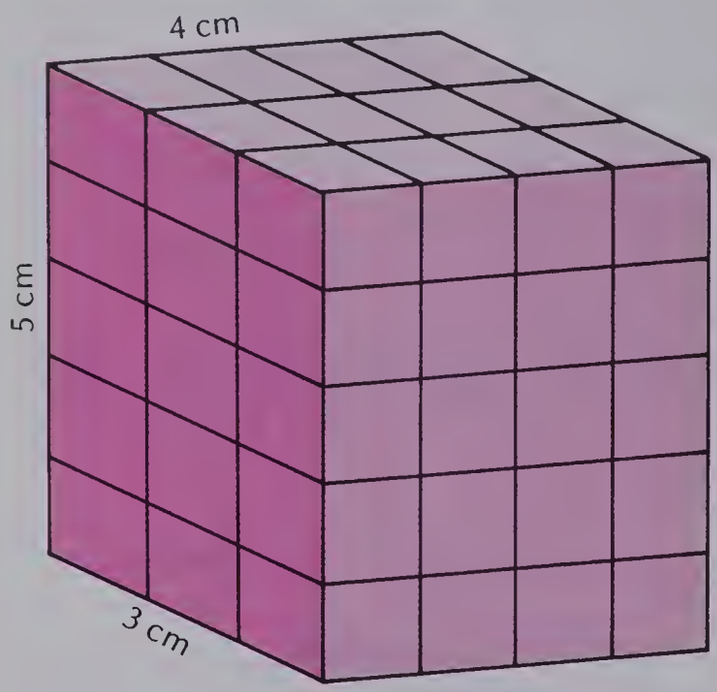
Volume

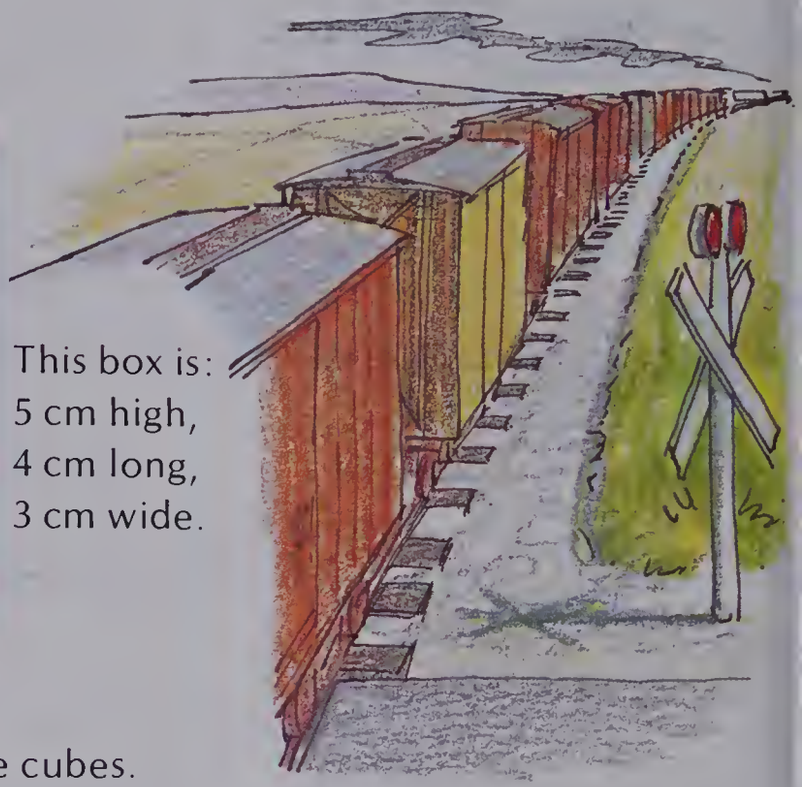
The **volume** of a solid is the measure of the space it occupies.

The number of cubic centimetres in a box is a measure of its **volume**.



one cubic centimetre
1 cm³





This box is:
5 cm high,
4 cm long,
3 cm wide.

The box contains 5 layers.
Each layer has 4×3 or 12 centimetre cubes.
Its volume is $5 \times (4 \times 3) = 5 \times 12$
$= 60 \text{ cm}^3$.

Volume = Length × Width × Height
$V = L \times W \times H$

Volume can also be measured in **cubic decimetres (dm³)** or in **cubic metres (m³)**.

EXERCISES

Calculate the volume of each box.

1. Length = 5 cm
   Width = 4 cm
   Height = 2 cm

2. L = 2 cm
   W = 2 cm
   H = 2 cm

3. L = 5 m
   W = 3 m
   H = 2 m

4. Length = 4 m
   Width = 3 m
   Height = 5 m

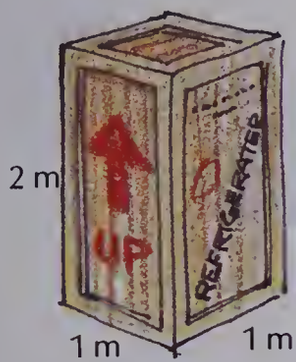
5. L = 5 dm
   W = 2 dm
   H = 4 dm

6. L = 1 dm
   W = 1 dm
   H = 1 dm

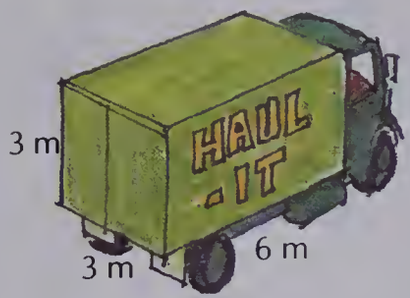
PRACTICE

Calculate the volume.

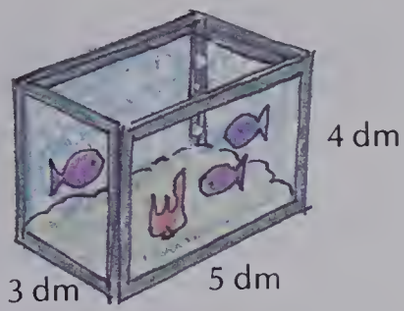
1.



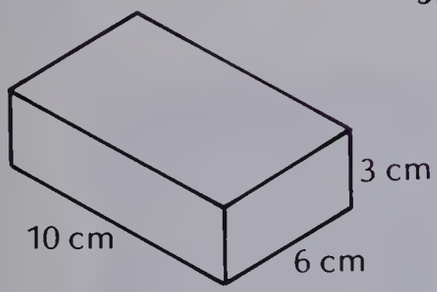
2.



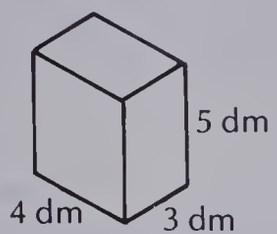
3.



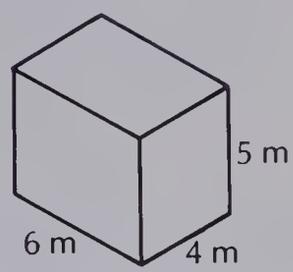
4.



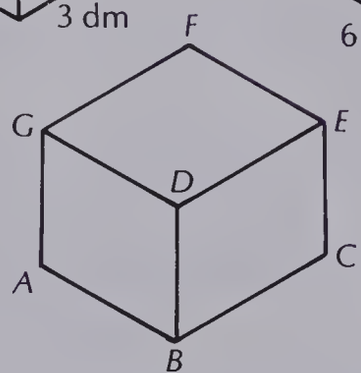
5.



6.



7. $BD = 7$ dm $\quad EC = 7$ dm
$AB = 8$ dm $\quad DG = 8$ dm
$BC = 9$ dm $\quad DE = 9$ dm



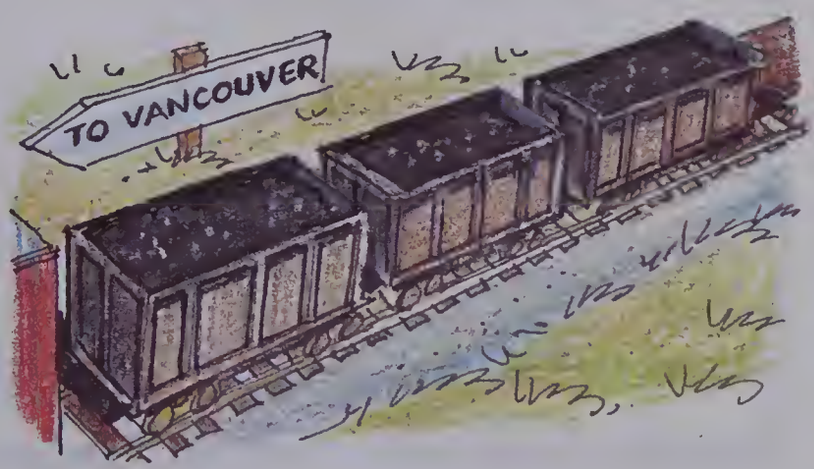
Solve.

8. How many cubic metres of air are there in a room 7 m wide, 3 m high, and 10 m long?

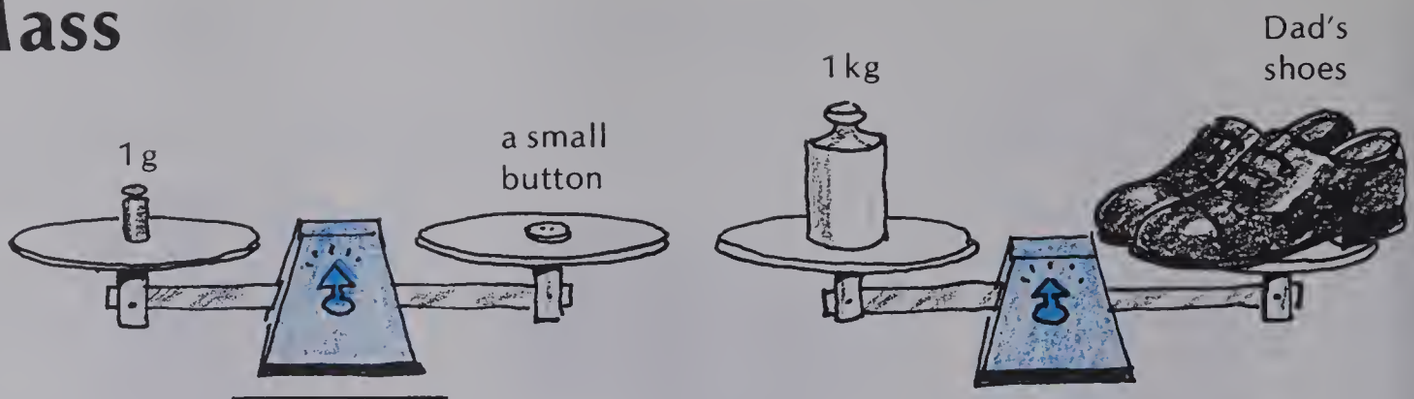
9. What is the volume of a wood-burning stove that is 1 m long, 40 cm wide, and 5 dm high?

Crow's Nest Pass

Three coal cars are each 3 m wide and 2 m high.
Attached end-to-end, they are 26 m long altogether.
There is 1 m between cars.
What is the volume of one coal car?



Mass



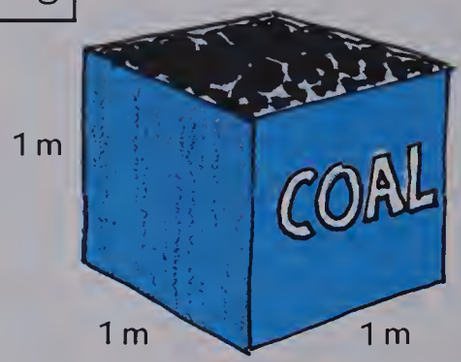
one gram
1 g

one kilogram
1 kg

1 kg = 1000 g

One tonne (1 t) is 1000 kg.

A cubic metre of coal
has a mass of about 1 t (one tonne).



EXERCISES

Which unit? Use the symbols g, kg, or t.

Object	Mass
1. dime	3■
2. hammer	1■
3. football player	100■
4. light bulb	50■
5. apple	250■
6. your friend	40■

Object	Mass
7. bike	6■
8. car	1■
9. elephant	4■
10. bag of potatoes	5■
11. fork	40■
12. truck	4■

Copy and complete each equation.

13. 1 kg = ■ g
14. 2 kg = ■ g
15. 3 kg = ■ g
16. 1 t = ■ kg
17. 2 t = ■ kg
18. 3 t = ■ kg

PRACTICE

What is a reasonable mass for each item?

1.	bag of flour	**a.**	2.0 kg
2.	chair	**b.**	2 g
3.	truckload of coal	**c.**	4 kg
4.	a horse	**d.**	6 t
5.	feather	**e.**	0.5 t
		f.	10 kg

Complete.

6. 3 kg = ■ g **7.** 2 t = ■ kg **8.** 2000 g = ■ kg

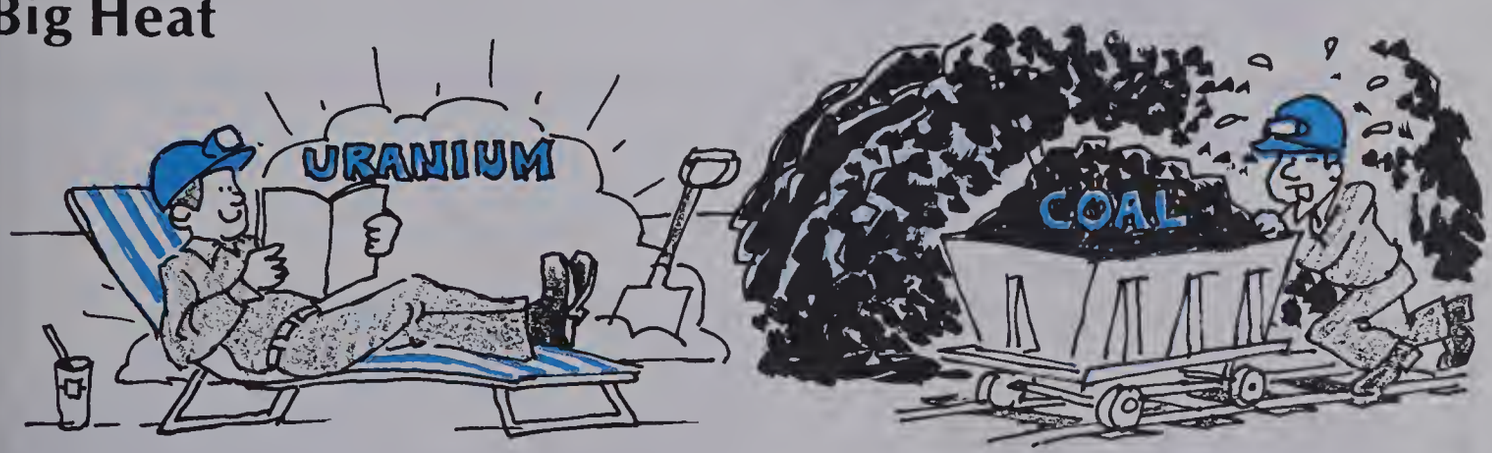
9. 3000 kg = ■ t **10.** 3.5 kg = ■ g **11.** 4.5 t = ■ kg

Solve.

12. How many 50 kg bags of potatoes are there in a tonne?

13. A brontosaur has a mass of 39.5 t. A tyrannosaur has a mass of 6.9 t. A brachiosaur has a mass of 75.8 t.
Which is heavier: a brontosaur and 4 tyrannosaurs **or** a brachiosaur?

Big Heat



One tonne of uranium can produce as much heat as 3 million tonnes of coal.

Canadian mines produce about 6000 t of uranium a year.

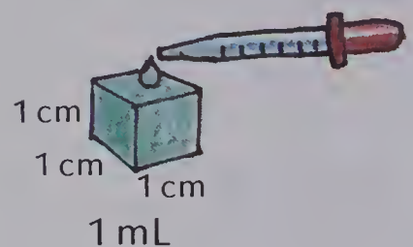
1. How much coal would have to be mined to get the same amount of energy?

2. About 25 million tonnes of coal is mined in Canada each year. How long would it take to mine the amount of coal in Question 1?

Capacity

Capacity is the measure of how much an object holds.
The **litre (L)** is used to measure
liquid **capacity**.

There are **1000 millilitres (mL)** in a litre.



1 mL

250 mL

1000 mL = 1 L
1 mL = 0.001 L

Large amounts of liquid can be measured in **kilolitres (kL)**.

1 kL = 1000 L

EXERCISES

Which unit would be most appropriate to measure each capacity: litre, millilitre, or kilolitre?

1. jug of lemonade
2. medicine in a bottle
3. gas in a car
4. city water tower
5. spoonful of gravy
6. a fish bowl
7. a swimming pool
8. a pickle barrel

Complete.

9. A milkshake is 550 ■.
10. A tube of toothpaste is 160 ■.
11. A tank truck of gasoline is 12 ■.
12. A can of soup is 250 ■.
13. A milk jug is 4 ■.

PRACTICE

Complete.

1. 1 L = ■ mL
2. 1 mL = ■ L
3. 0.5 L = ■ mL
4. 2000 mL = ■ L
5. 2500 mL = ■ L
6. 100 mL = ■ L
7. 1 kL = ■ L
8. 1 kL = ■ mL
9. 1 L = ■ kL

What is a reasonable capacity for each item?

10. a cup of hot chocolate
11. a bucket
12. a bottle of dishwashing liquid
13. a raindrop
14. a swimming pool

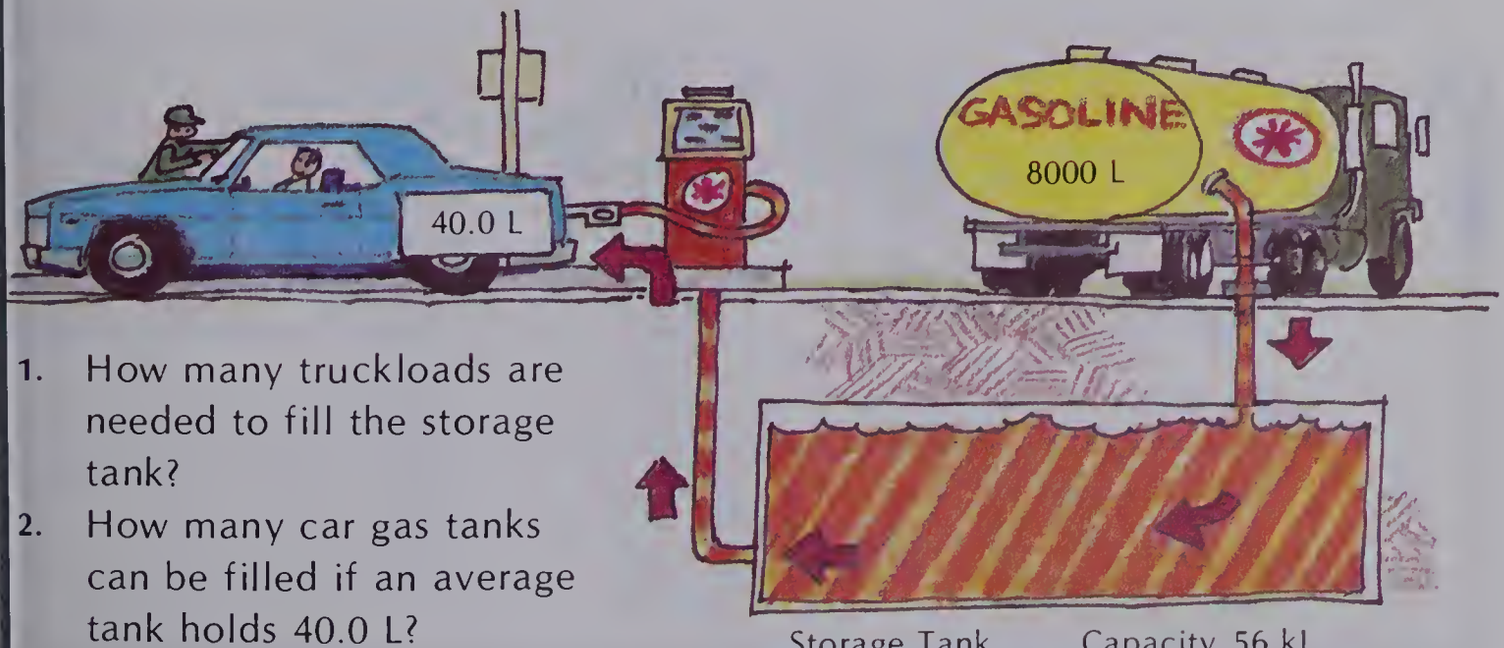
a. 500 mL
b. 1 mL
c. 250 mL
d. 250 L
e. 250 kL
f. 6 L

Solve.

15. The family car takes 8 L of oil. How much would an oil change cost if a litre sells for $1.45?

16. Ellen mixes 60 mL of oil with 1 L of gasoline for the lawn mower. How much oil does she need to mix with 2.5 L of gas?

Filling Up

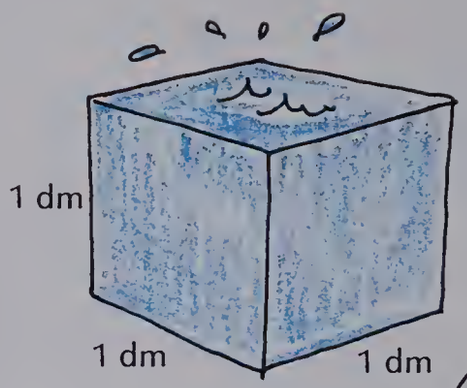


1. How many truckloads are needed to fill the storage tank?
2. How many car gas tanks can be filled if an average tank holds 40.0 L?

Storage Tank Capacity 56 kL

Mass, Capacity, and Volume

This cube of water at 4°C
has very special properties.

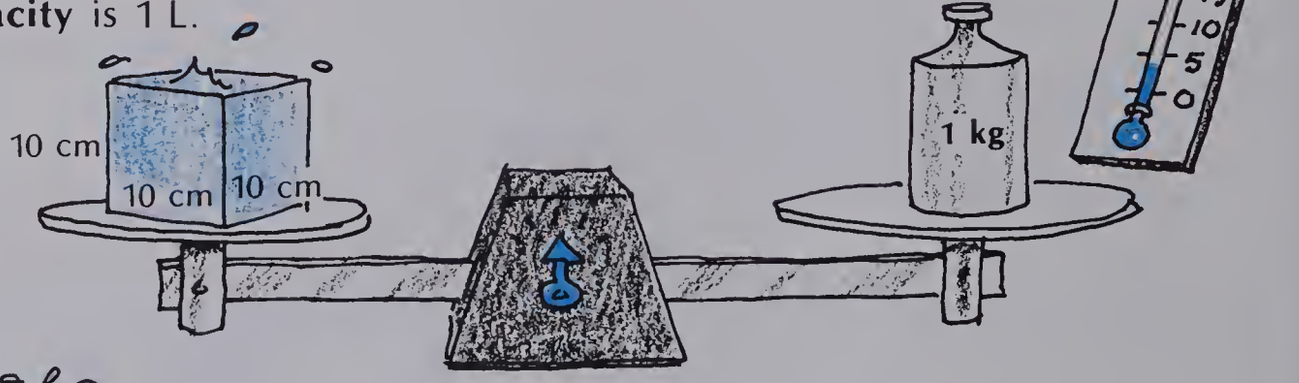


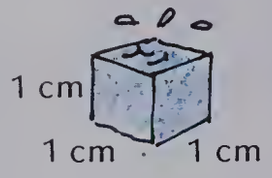
It measures 1 dm or 10 cm on each side.

Its **volume** is 1 dm^3 **or** 1000 cm^3.

Its **mass** is 1 kg.

Its **capacity** is 1 L.





1 cm^3 of water has a mass of 1 g
and a capacity of 1 mL.

EXERCISES

Copy and complete the chart.

Volume of Water	Capacity	Mass
1 dm^3	1. ■ L	2. ■ kg
5 dm^3	3. ■ L	4. ■ kg
0.5 dm^3	5. ■ L	6. ■ kg
1 cm^3	7. ■ mL	8. ■ g
1000 cm^3	9. ■ mL	10. ■ g
500 cm^3	11. ■ mL	12. ■ g
500 cm^3	13. ■ L	14. ■ kg

PRACTICE

1. Copy and complete the chart for water.

Capacity		Mass		Volume	
L	mL	g	kg	cm^3	dm^3
2					
	500				
		3000			
			1.5		
				100	
					2.5

Solve.

2. Which liquid is heaviest?
   For what is this liquid often used?
3. Why does oil float in sea water?
4. Why do you think sea water is heavier than ordinary water?

Liquid	Mass of 1 L
Mercury	14 kg
Oil	920 g
Turpentine	870 g
Sea water	1025 g

How Heavy is the Air?

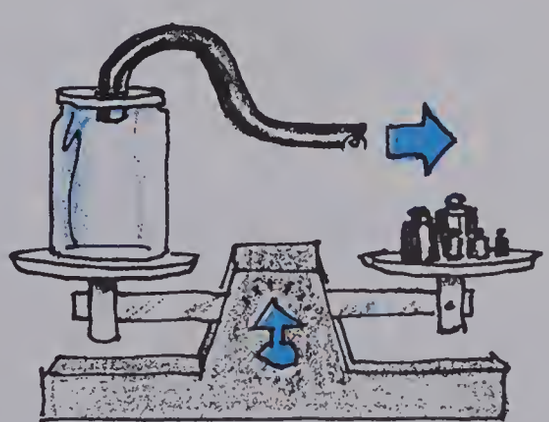
A scientist used a very accurate balance to measure the mass of air.

She found that a one-litre jar filled with air had a total mass of 528.675 g.

She then took the air out of the jar with a vacuum pump.

After the air was pumped out, the jar had a mass of 527.382 g.

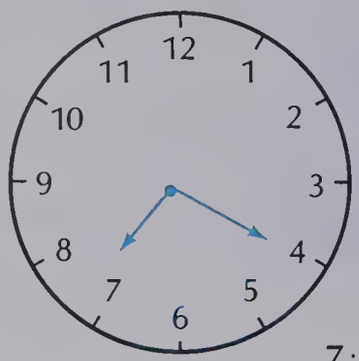
How heavy is a litre of air?



Time

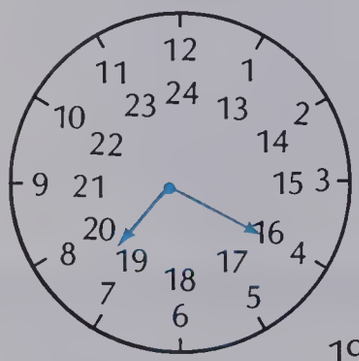
The **twenty-four hour clock** is often used for timetables and digital clocks.

12 h clock



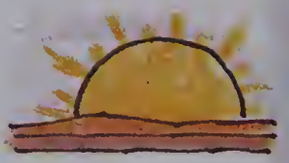
7:20 P.M.

24 h clock



19:20

12 h clock		24 h clock
1 A.M.	→	01:00
2 A.M.	→	02:00
3 A.M.	→	03:00
•		•
•		•
•		•
10 A.M.	→	10:00
11 A.M.	→	11:00
12 Noon	→	12:00
1 P.M.	→	13:00
2 P.M.	→	14:00
3 P.M.	→	15:00
•		•
•		•
•		•
10 P.M.	→	22:00
11 P.M.	→	23:00
12 Midnight	→	24:00



Morning

Afternoon

Evening

EXERCISES

Write the time using the 24 h clock.

1. 4:00 A.M.
2. 5:30 A.M.
3. 1:25 P.M.
4. 4:15 P.M.
5. 6:15 P.M.
6. 9:45 P.M.
7. 12:30 P.M.
8. Noon
9. Midnight

How long?

10. from 07:00 to 09:00
11. from 07:00 to 12:00
12. from 07:00 to 12:30
13. from 07:30 to 12:00
14. from 07:30 to 13:00
15. from 07:45 to 13:00
16. from 12:45 to 19:00
17. from 12:45 to 19:20
18. from 09:20 to 16:50
19. from 09:50 to 16:20

PRACTICE

Answer the question by using the airline timetable.

1. How many flights leave Calgary each day?

2. List the flights that leave Calgary in the morning.

3. If you lived in Calgary and you wanted to arrive in Vancouver about noon, what flight would you take?

4. Use the time zone chart to find how long each flight takes.

H & M Airline Timetable

From Calgary to:

	Depart	Arrive	Flight
Vancouver	07:00	07:20	201
	12:20	12:40	117
	17:00	17:20	277
Winnipeg	14:20	18:08	252
Chicago	06:55	11:45	836
	13:05	18:30	822
Toronto	00:30	07:05	188
	12:35	18:00	120
Montreal	11:30	17:20	176
	23:00	05:00	111
Halifax	12:55	21:55	154
	16:30	02:02	634

Time	08:00	09:00	10:00	11:00	12:00	12:30
Zone	Pacific	Mountain	Central	Eastern	Atlantic	Newfoundland
Cities	Vancouver	Calgary	Winnipeg Chicago	Toronto Montreal	Halifax	St. John's

REVIEW

M9 Calculate the volume of each box.

1. $L = 3$ cm, $W = 4$ cm, $H = 2$ cm
2. $L = 5$ m, $W = 3$ m, $H = 2$ m

M10 Complete.

3. 4 kg = ■ g
4. 1500 g = ■ kg
5. ■ t = 3000 kg

M11

6. 2 L = ■ mL
7. 2500 mL = ■ L
8. 1 kL = ■ L

M12

9. What is the mass of 1 L of water?
10. What is the volume of 1 mL of water?

M13 How long?

11. from 09:15 to 12:10
12. from 10:50 to 18:35

TEST UNIT 5

Write the most appropriate unit of length.

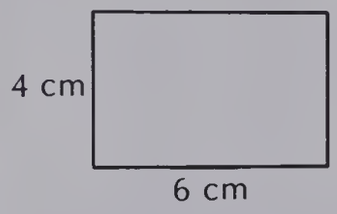
1. distance around the world
2. amount of snowfall
3. height of a mountain
4. thickness of paper

Copy and complete.

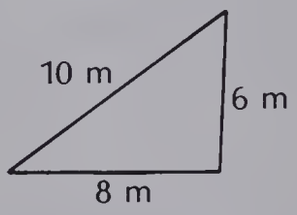
5. 1 ha = ■ m^2
6. The area of a postage stamp is about 6 ■.
7. The area of New Brunswick is about 73 000 ■.

What is the perimeter and area of each figure?

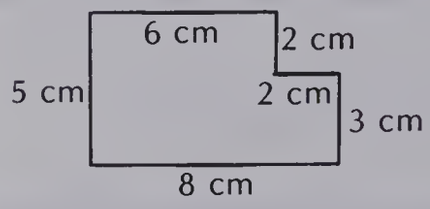
8.



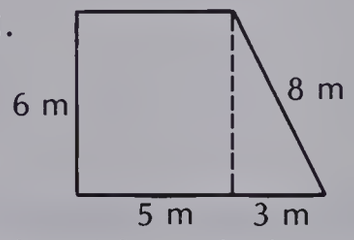
9.



10.



11.



Calculate the circumference of a circle with each diameter.

12. 3 cm
13. 10 cm
14. 25 km
15. 18 m

Calculate the area of a circle with each radius.

16. 2 cm
17. 10 cm
18. 5 km
19. 12 mm

Calculate the volume of each box.

20. $L = 6$ cm, $W = 3$ cm, $H = 5$ cm
21. $L = 2$ m, $W = 8$ m, $H = 10$ m

Complete.

22. 2 kg = ■ g
23. 4000 kg = ■ t
24. 8.5 t = ■ kg
25. 3 L = ■ mL
26. 3500 mL = ■ L
27. 2000 L = ■ kL
28. What is the mass of 2 L of water?

How long?

29. from 08:25 to 11:25
30. from 06:50 to 13:30

DIVISION

Find the quotient.

1. $39 \div 6$	2. $44 \div 5$	3. $70 \div 8$	4. $65 \div 9$
5. $68 \div 5$	6. $83 \div 2$	7. $135 \div 6$	8. $208 \div 7$
9. $5\overline{)2573}$	10. $8\overline{)969}$	11. $3\overline{)7578}$	12. $6\overline{)25\,526}$
13. $4\overline{)8045}$	14. $9\overline{)9270}$	15. $6\overline{)37\,213}$	16. $3\overline{)60\,122}$
17. $40\overline{)167}$	18. $20\overline{)832}$	19. $50\overline{)2491}$	20. $60\overline{)4925}$
21. $17\overline{)156}$	22. $43\overline{)285}$	23. $79\overline{)567}$	24. $81\overline{)496}$
25. $49\overline{)548}$	26. $68\overline{)1354}$	27. $37\overline{)1628}$	28. $55\overline{)2891}$
29. $73\overline{)2815}$	30. $36\overline{)2521}$	31. $87\overline{)5203}$	32. $65\overline{)19\,498}$
33. $24\overline{)49\,325}$	34. $51\overline{)55\,672}$	35. $43\overline{)88\,297}$	36. $33\overline{)99\,288}$

Solve.

37. A chart shows that Canada imported $45,00 worth of oil in a recent year. The chart gives data in millions of dollars. What was Canada's monthly oil bill for imports during that year?

38. The Nardi family spent $60.06 on gasoline during the month of July. If a litre of gasoline costs 42¢, how many litres did the family use during the month?

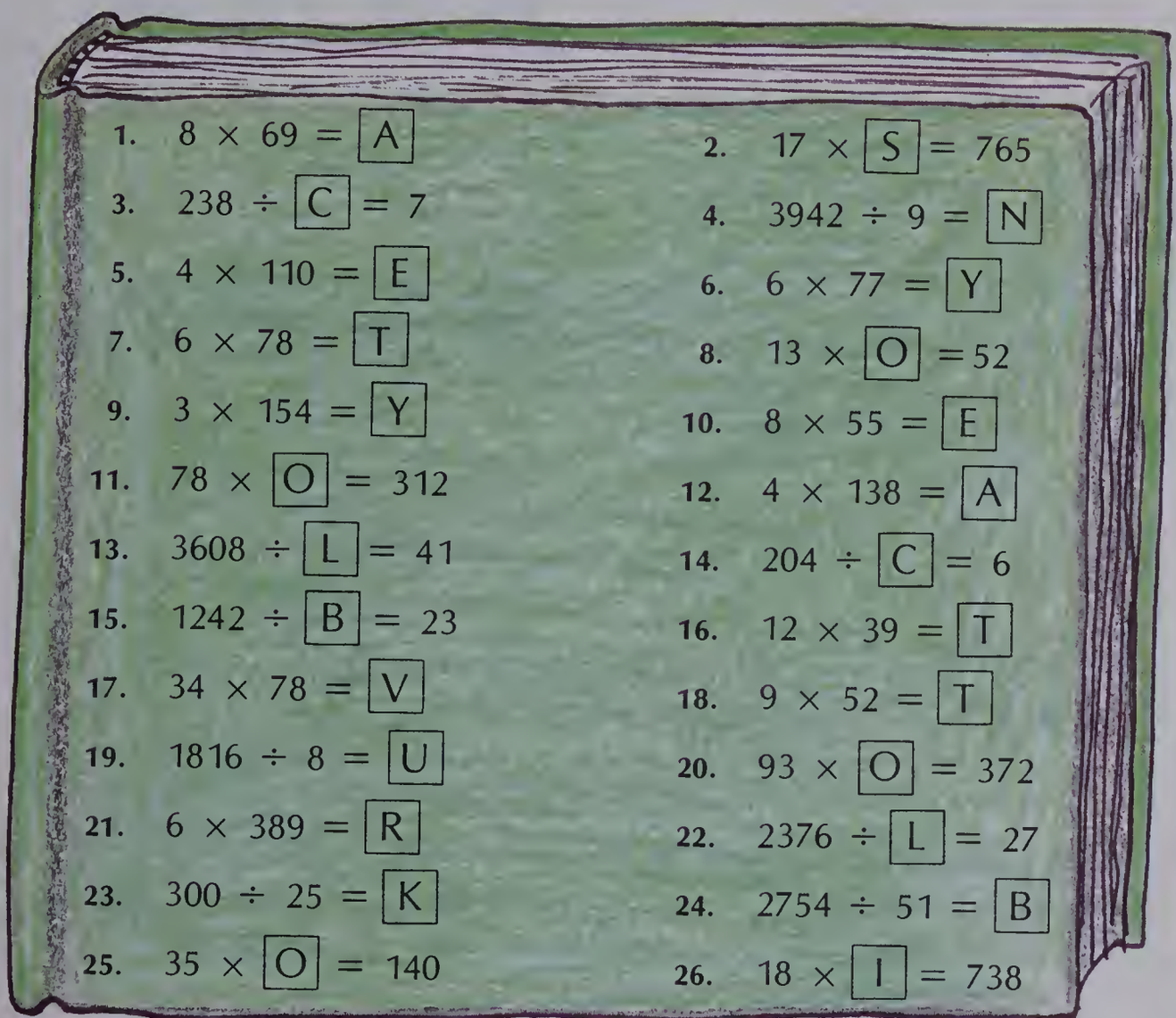
39. One stormy evening, 9856 passengers landed at a busy airport. Half of them had their arrival times delayed. How many passengers had their arrival times delayed?

40. At a garage sale Mrs. Lee, Mrs. Kock, and Mrs. Amery made $849. How much would they each get if they shared the money equally?

UNIT 6
NUMBER THEORY

Decode a Book

Find the value for the letter for each equation.
Decode the message below.



1. $8 \times 69 =$ A
2. $17 \times$ S $= 765$
3. $238 \div$ C $= 7$
4. $3942 \div 9 =$ N
5. $4 \times 110 =$ E
6. $6 \times 77 =$ Y
7. $6 \times 78 =$ T
8. $13 \times$ O $= 52$
9. $3 \times 154 =$ Y
10. $8 \times 55 =$ E
11. $78 \times$ O $= 312$
12. $4 \times 138 =$ A
13. $3608 \div$ L $= 41$
14. $204 \div$ C $= 6$
15. $1242 \div$ B $= 23$
16. $12 \times 39 =$ T
17. $34 \times 78 =$ V
18. $9 \times 52 =$ T
19. $1816 \div 8 =$ U
20. $93 \times$ O $= 372$
21. $6 \times 389 =$ R
22. $2376 \div$ L $= 27$
23. $300 \div 25 =$ K
24. $2754 \div 51 =$ B
25. $35 \times$ O $= 140$
26. $18 \times$ I $= 738$

462 4 227 34 552 438 468

468 440 88 88 552

54 4 4 12 54 462

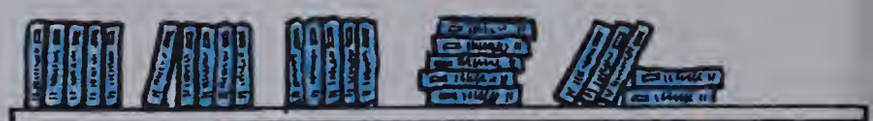
41 468 45 34 4 2652 440 2334

Multiples and the LCM

As we count by 4s, we name the **multiples** of 4.

4, 8, 12, 16, 20, . . .

As we count by 5s, we name the **multiples** of 5.



5, 10, 15, 20, 25, . . .

The multiples of 4 are: 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, . . .
The multiples of 5 are: 5, 10, 15, 20, 25, 30, 35, 40, . . .

The common multiples of 4 and 5 are: 20, 40, . . .
The **Least Common Multiple (LCM)** is 20.

EXERCISES

Write the next seven multiples.

1. 3, 6, 9, ■, ■, ■, . . .
2. 4, 8, 12, ■, ■, ■, . . .
3. 6, 12, 18, ■, ■, ■, . . .
4. 10, 20, 30, ■, ■, ■, . . .
5. Write the first ten multiples of 7.
6. Write the next four multiples of 5 after 35.
7. Write the multiples of 2 between 16 and 32.

Copy the multiples. What is the LCM?

8. 3: 3, 6, 9, 12, . . .
   4: 4, 8, 12, 16, . . .
   LCM = ■
9. 2: 2, 4, 6, 8, . . .
   3: 3, 6, 9, 12, . . .
   LCM = ■

List the multiples of each. Find the LCM.

10. 6 and 9
11. 3 and 5
12. 4 and 7
13. 2 and 4

PRACTICE

Write the next seven multiples.

1. 5, 10, 15, ■, ■, ■, . . .
2. 8, 16, 24, ■, ■, ■, . . .
3. 9, 18, 27, ■, ■, ■, . . .
4. 12, 24, 36, ■, ■, ■, . . .
5. Write the first ten multiples of 8.
6. Write the next four multiples of 3 after 22.
7. Write the multiples of 5 between 79 and 106.
8. Write the multiples of 4 between 47 and 73.

List the multiples of each. Find the LCM.

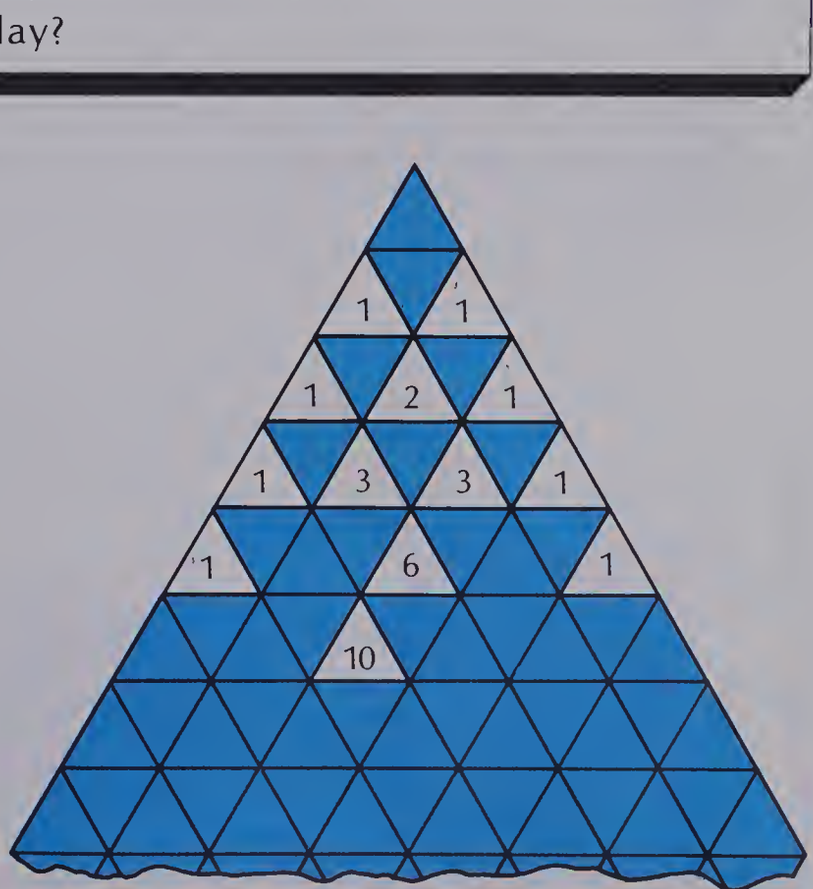
9. 6 and 8
10. 3 and 7
11. 8 and 10
12. 12 and 18
13. 12 and 16
14. 20 and 30
15. 2, 3, and 4
16. 3, 6, and 9
17. 2, 4, and 5
18. 40, 50, and 60

Solve.

19. Ann set up an exercise schedule for herself. She planned to do sit-ups and push-ups on Monday. After that, she would do sit-ups on every second day and push-ups on every third day. How many days after Monday would she again do both sit-ups and push-ups on the same day?

Pascal's Triangle

Copy the triangle and extend the number pattern.



Divisibility Rules

2 A number is divisible by 2, if its last digit is 0, 2, 4, 6, or 8.

$$2\overline{)4180} = 2090$$

3 A number is divisible by 3, if the sum of its digits is divisible by 3.

$$3\overline{)1623} = 541$$

4 A number is divisible by 4, if the number formed by its last two digits is divisible by 4.

$$4\overline{)1016} = 254$$

5 A number is divisible by 5, if its last digit is 0 or 5.

$$5\overline{)1735} = 347$$

6 A number is divisible by 6, if it is divisible by 2 and by 3.

$$6\overline{)5622} = 937$$

9 A number is divisible by 9, if the sum of its digits is divisible by 9.

$$9\overline{)3411} = 379$$

10 A number is divisible by 10, if its last digit is 0.

$$10\overline{)7150} = 715$$

EXERCISES

Which number is **evenly** divisible?
Find its quotient.

1. by 5: 610 **or** 612
2. by 10: 642 **or** 640
3. by 2: 313 **or** 314
4. by 4: 534 **or** 536
5. by 3: 840 **or** 842
6. by 9: 693 **or** 683
7. by 6: 482 **or** 483
8. by 6: 424 **or** 432

PRACTICE

Copy the chart. Write the quotients which have no remainders.

	Divisible	by 2	by 3	by 4	by 5	by 6	by 9	by 10
1.	51							
2.	69							
3.	87							
4.	270							
5.	400							
6.	516							
7.	734							
8.	705							
9.	926							
10.	5004							
11.	1116							
12.	8140							

Solve.

13. Mrs. Fox bought 42 marigold seedlings. Can she put an equal number in 3 separate garden areas in her yard with none left over?

Square Numbers

The intersections form a picture of the first 3 square numbers.
Draw a picture of the next 4 square numbers and name them.

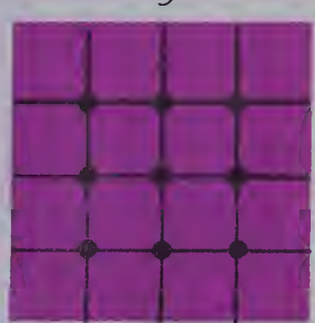
1

1×1 **or** 1^2

4

2×2 **or** 2^2

9



3×3 **or** 3^2

Factors and the GCF

Multiplications with a product of 14.

$14 = 1 \times 14$
$14 = 2 \times 7$

The **factors** of 14 are: 1, 2, 7, 14

Multiplications with a product of 20.

$20 = 1 \times 20$
$20 = 2 \times 10$
$20 = 4 \times 5$

The **factors** of 20 are: 1, 2, 4, 5, 10, 20

Factors of 14: 1, 2, 7, 14
Factors of 20: 1, 2, 4, 5, 10, 20

14 and 20 have two **common** factors, 1 and 2.

The **Greatest Common Factor (GCF)** of 14 and 20 is 2.

EXERCISES

Write all of the multiplications for each product. List the factors.

1. $24 = 1 \times \blacksquare$ $3 \times \blacksquare$
   $2 \times \blacksquare$ $4 \times \blacksquare$

   Factors of 24: ■, ■, ■, ■, ■, ■, ■, ■

2. 54: $1 \times \blacksquare$ $3 \times \blacksquare$
   $2 \times \blacksquare$ $6 \times \blacksquare$

   Factors of 54: ■, ■, ■, ■, ■, ■, ■, ■

3. 15
4. 28
5. 13
6. 21

Answer yes or no.

7. Is 3 a factor common to 18 and 15?
8. Is 9 a factor common to 81 and 89?
9. Is 16 a factor common to 16 and 32?
10. Is 5 a factor common to 35 and 48?
11. Is 8 a factor common to 80 and 120?

List the factors for each. Find the GCF.

12. 4 and 6
13. 6 and 8
14. 9 and 15
15. 12 and 18
16. 3 and 7
17. 13 and 19
18. 24 and 32
19. 18 and 30
20. 7 and 9

PRACTICE

Write all of the multiplications for each product. List the factors.

1. 36	**2.** 23	**3.** 48	**4.** 56
5. 49	**6.** 47	**7.** 72	**8.** 51
9. 60	**10.** 100	**11.** 19	**12.** 64

Find the GCF.

13. 16 and 18	**14.** 17 and 29	**15.** 63 and 90
16. 25 and 38	**17.** 42 and 33	**18.** 15 and 26
19. 39 and 52	**20.** 100 and 120	**21.** 48 and 60
22. 45 and 75	**23.** 14 and 49	**24.** 60 and 90

Solve.

25. Mrs. Taylor baked 54 oatmeal cookies and 57 chocolate chip cookies. How many boxes can she make up each containing equal numbers of each kind of cookie?

26. Can 81 pennies and 54 nickels be shared equally by 9 children?

27. Ms. Frank shelved 21 math books and 49 readers. How many shelves does she use if each shelf holds equal numbers of each kind of book?

28. Mr. Holt packed away 24 red books, 60 blue books, and 48 green books. The cartons will not hold more than 20 books. How many cartons did he make up if each contained equal numbers of each colour of book?

Cubic Numbers

The pictures show the first three cubic numbers.
Draw a picture of the next 4 cubic numbers and name them.

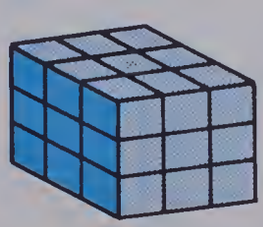
1

$1 \times 1 \times 1$ **or** 1^3

8

$2 \times 2 \times 2$ **or** 2^3

27



$3 \times 3 \times 3$ **or** 3^3

Prime and Composite Numbers

19 is divisible only by 1 and 19.

The factors of 19 are: 1, 19.

When a number has **only two factors**, it is called a **prime number**.

25 is divisible by 1, 5, and 25.
The factors of 25 are: 1, 5, 25.

When a number has **more than two factors**, it is called a **composite number**.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

EXERCISES

List the factors for each. Write prime or composite.

1. 4 **2.** 2 **3.** 13 **4.** 7
5. 49 **6.** 22 **7.** 41 **8.** 24

Write the prime numbers in each group.

9. 10, 11, 12, 13 **10.** 20, 21, 22, 23 **11.** 3, 5, 7, 9

Write the composite numbers in each group.

12. 14, 15, 16, 17 **13.** 30, 31, 32, 33 **14.** 70, 71, 72, 73

15. **a.** Write all of the prime numbers less than 20.
b. Write all of the composite numbers less than 20.
c. Write all of the prime numbers greater than 20 but less than 30.

PRACTICE

Is the number prime or composite?

1. 17	**2.** 27	**3.** 45	**4.** 57
5. 61	**6.** 51	**7.** 63	**8.** 73
9. 95	**10.** 84	**11.** 83	**12.** 93
13. 29	**14.** 49	**15.** 69	**16.** 200
17. 108	**18.** 111	**19.** 101	**20.** 117

21. Write the prime numbers between 20 and 50.

22. Write the composite numbers between 30 and 45.

Solve.

23. Which number of gum drops is impossible to share evenly with other people: 57 or 59?

24. Which number of books couldn't you share equally with friends: 12 or 13?

25. What is the largest prime less than 21?

26. What is the smallest prime greater than 49?

27. Which divisibility rule shows that 171 is not prime?

28. Which divisibility rule shows that 51 is composite?

Twin Primes

Prime numbers that have a difference of 2 are called **twin primes**.

Can you find the other seven twin primes that are less than 100?

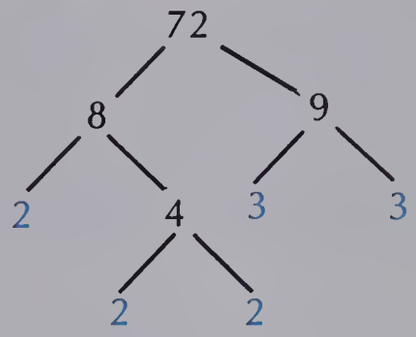
Prime Factors

The factors of 72 are: 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72.

Only 2 and 3 are **prime** numbers.

The **prime factors** of 72 are: 2, 3.

The **prime factors** of 72 can be found using a **factor tree**.



> Any number can be written as a product of its prime factors.

$72 = 2 \times 2 \times 2 \times 3 \times 3$

$= 2^3 \times 3^2$

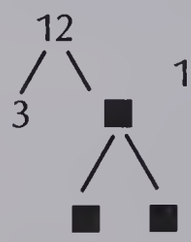
The prime factors can be multiplied to find other factors.

For example, $2 \times 2 \times 3 = 12$ is a factor of 72.

EXERCISES

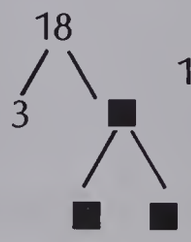
Use a factor tree to write the number as a product of prime factors.

1.



12 = ■ × ■ × ■

2.



18 = ■ × ■ × ■

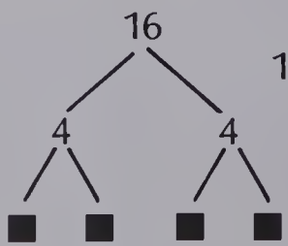
3. 20 **4.** 24 **5.** 27 **6.** 30

Rewrite using exponents.

7. $3 \times 3 \times 2 \times 2$ **8.** $2 \times 2 \times 5$ **9.** $7 \times 7 \times 2 \times 2 \times 2$

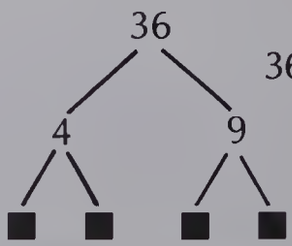
Use a factor tree to find the prime factors. Write the product using exponents.

10.



16 = ■■

11.



36 = ■■ × ■■

PRACTICE

Use a factor tree to write the number as a product of prime factors. Write the answer without using exponents.

1. 42	**2.** 45	**3.** 52	**4.** 36
5. 66	**6.** 77	**7.** 63	**8.** 75

Use a factor tree to write the number as a product of prime factors. Write the answer using exponents.

9. 60	**10.** 54	**11.** 24	**12.** 100
13. 48	**14.** 27	**15.** 32	**16.** 72
17. 125	**18.** 64	**19.** 81	**20.** 500

Use factor trees to help find the GCF.

21. 45 and 36	**22.** 26 and 55
23. 60 and 72	**24.** 70 and 98
25. 64 and 256	**26.** 175 and 81
27. 96 and 144	**28.** 48, 32, and 72

REVIEW

A25 List the multiples for each. Find the LCM.

1. 4 and 6 **2.** 10 and 12 **3.** 5 and 6

A26 Is 34 750 divisible by:

4. 2? **5.** 5? **6.** 9? **7.** 4? **8.** 6?

A27 List the factors for each. Find the GCF.

9. 6 and 9 **10.** 12 and 18 **11.** 24 and 36

A28 Is the number prime or composite?

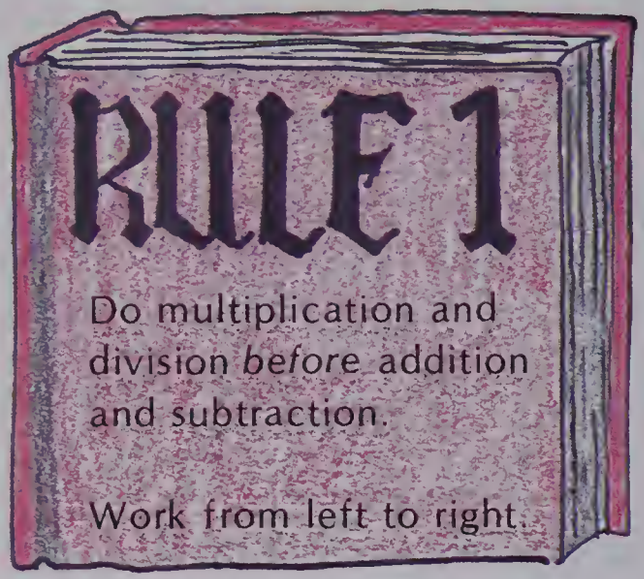
12. 19 **13.** 49 **14.** 50 **15.** 61 **16.** 87

A29 Use a factor tree to express the number as a product of prime factors. Write the answer using exponents.

17. 8 **18.** 20 **19.** 100 **20.** 60 **21.** 90

Order of Operations

Use Rule 1 to *simplify* number expressions.



$45 - 6 \div 2$
$= 45 - 3$
$= 42$

$38 + 9 \times 2 - 6 + 2$
$= 38 + 18 - 6 + 2$
$= 56 - 6 + 2$
$= 50 + 2$
$= 52$

EXERCISES

Copy and simplify the expression.

1. $68 + 9 \times 3$
   $= 68 +$ ■
   $=$ ■

2. $49 - 2 \times 4 + 6$
   $= 49 -$ ■ $+ 6$
   $=$ ■ $+ 6$
   $=$ ■

3. $25 \div 5 + 6 - 4$
   $=$ ■ $+ 6 - 4$
   $=$ ■ $- 4$
   $=$ ■

4. $15 - 3 \div 1 + 2$
   $= 15 -$ ■ $+ 2$
   $=$ ■ $+ 2$
   $=$ ■

5. $27 + 4 - 8 \div 2$
   $= 27 + 4 -$ ■
   $= 31 -$ ■
   $=$ ■

6. $60 + 16 \div 4 - 4$
   $= 60 +$ ■ $- 4$
   $=$ ■ $- 4$
   $=$ ■

7. $46 - 3 + 2$

8. $97 + 6 \div 2$

9. $7 + 5 \times 3 - 6$

10. $18 \div 2 + 4 \times 3$

PRACTICE

Copy and simplify the expression.

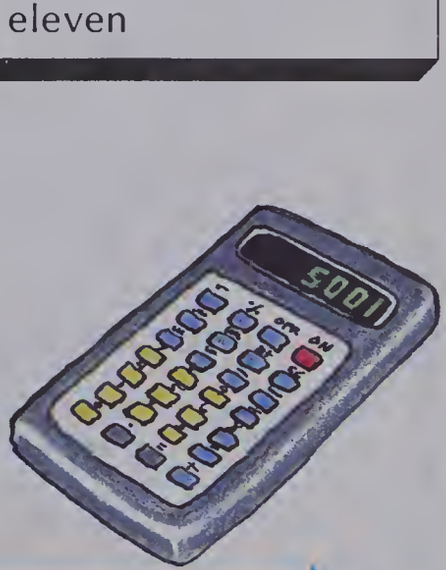
1. $35 + 6 \times 3$
2. $15 \div 5 - 2$
3. $27 - 6 + 4$
4. $18 \div 3 \div 2$
5. $90 - 48 \div 6$
6. $35 + 7 \times 4$
7. $12 \times 2 \div 8$
8. $16 + 12 - 3$
9. $16 - 2 + 3 \times 3$
10. $9 \times 8 - 4 + 2$
11. $79 + 42 \div 7 - 18$
12. $150 - 10 + 5 \times 2$
13. $16 \div 2 + 25 \div 5$
14. $84 - 6 \times 6 + 6$
15. $15 + 2 \times 2 + 3$
16. $60 - 4 + 9 \div 3$
17. $18 \times 10 + 35 \div 7$
18. $24 + 28 \div 4 - 2$
19. $73 - 20 \div 4 + 1$
20. $32 + 38 - 6 \div 6$

Write the expression.

21. four minus three times one
22. twenty-five divided by five plus six
23. the difference of six times eight and seventeen
24. the sum of fifty-two and thirty divided by ten
25. the difference of two times three and ninety times three
26. the difference of nine times two and nine times eleven

USING THE CALCULATOR

Use a calculator to find the answer.



a. $5001 - 3584 + 2072 \div 37$

b. $157 - 30\,174 \div 321 + 168$

c. $7934 + 6526 - 1487$

d. $302 + 1050 \div 14 - 866$

e. $48 \times 52 - 1081 \div 47$

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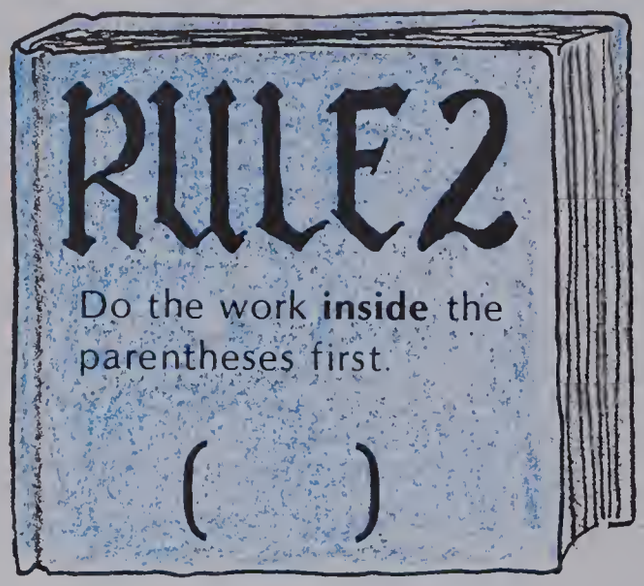
Order of Operations

Use Rule 2 to simplify number expressions.



$50 \times 2 + 3$
$= 100 + 3$
$= 103$

$50 \times (2 + 3)$
$= 50 \times 5$
$= 250$

} Compare.

$16 + 4 - 5 + 8$
$= 23$

$(16 + 4) - (5 + 8)$
$= 20 - 13$
$= 7$

} Compare.

EXERCISES

Copy and simplify the expression.

1. $8 \times (15 + 25)$
$= 8 \times \blacksquare$
$= \blacksquare$

2. $86 + (65 - 35)$
$= 86 + \blacksquare$
$= \blacksquare$

3. $(67 + 80) \times (6 - 5)$
$= \blacksquare \times \blacksquare$
$= \blacksquare$

4. $(89 - 20) \div (12 - 9)$
$= \blacksquare \div \blacksquare$
$= \blacksquare$

5. $42 \times (15 - 7)$
$= 42 \times \blacksquare$
$= \blacksquare$

6. $100 \div (19 - 15)$
$= 100 \div \blacksquare$
$= \blacksquare$

7. $(16 + 4) \times (8 - 2)$
$= \blacksquare \times \blacksquare$
$= \blacksquare$

8. $(25 + 9) \div (60 - 43)$
$= \blacksquare \div \blacksquare$
$= \blacksquare$

9. $11 + (40 - 25)$

10. $(9 + 3) \div (8 - 4)$

11. $72 \div (14 - 5)$

12. $(16 - 8) \times (24 + 6)$

PRACTICE

Simplify each expression.

1. $3 \times (15 - 4)$
2. $(60 + 90) \div (6 - 2)$
3. $(8 \div 4) \times (95 - 25)$
4. $8 \times (50 - 40)$
5. $150 \div (72 \div 12)$
6. $(44 - 24) \times (35 - 15)$
7. $(56 - 34) \times (126 + 74)$
8. $600 \div (285 + 15)$
9. $486 \times (85 - 85)$
10. $(21 - 21) \times (21 - 21)$
11. $592 \times (793 - 793)$
12. $(2 \times 72) \div (720 \div 5)$
13. $(46 \div 2) \times (18 - 18)$
14. $847 \div (11 \times 11)$

Simplify. Use $<$, $=$, or $>$.

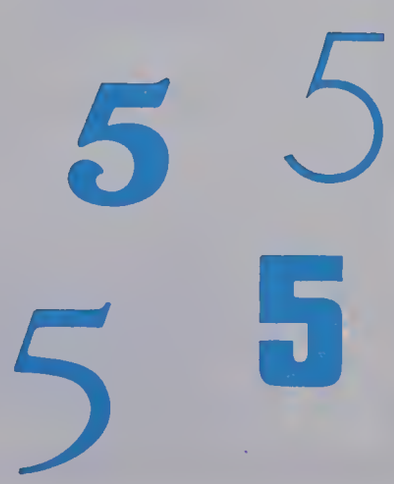
15. $88 \times (8 - 8)$ ■ $8 + 8 + 8 - 8$
16. $(6 \div 6) \times (6 - 6)$ ■ $6 \div 6 - 6 \div 6$
17. $4 - 4 + 4$ ■ $4 \times (4 \div 4)$
18. $7 \times 7 - (7 - 7)$ ■ $77 - (7 + 7)$
19. $(9 \times 9) \div (9 \times 9)$ ■ $9 \times (99 \div 99)$
20. $3 \times (33 - 33)$ ■ $3 \times 3 - (3 + 3)$

Write the expression.

21. two times the sum of 14 and 22
22. nine times the difference between 150 and 127
23. the sum of 6 and 9 divided by the difference between 31 and 28
24. one hundred times the difference of 6 and 5
25. seventeen times the sum of 20 and 3

Four Fives

Can you write 10 number expressions, using only four fives, that equal the numbers 1 through 10?



Here's an example for 10:

$$(5 + 5) - (5 - 5) = 10$$

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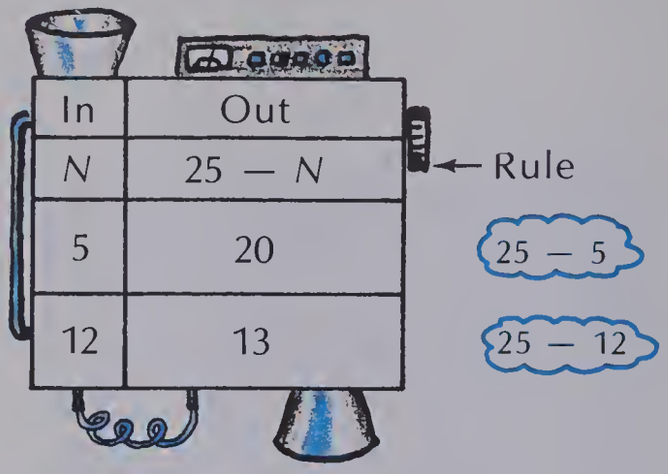
Number Machines

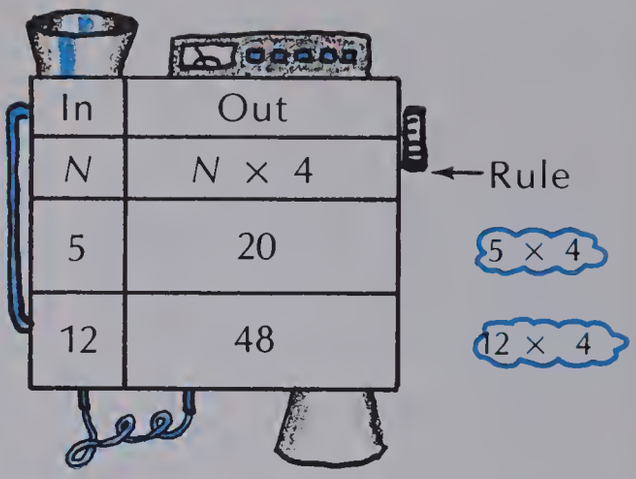


In	Out
N	$25 - N$
5	20
12	13

← Rule

$25 - 5$

$25 - 12$

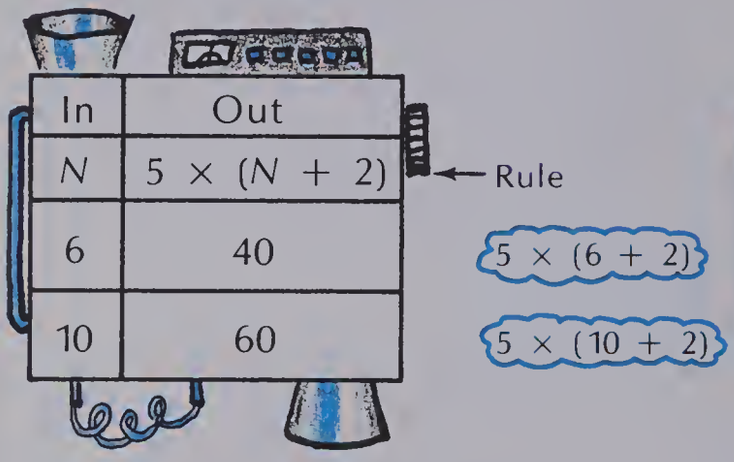


In	Out
N	$N \times 4$
5	20
12	48

← Rule

5×4

12×4

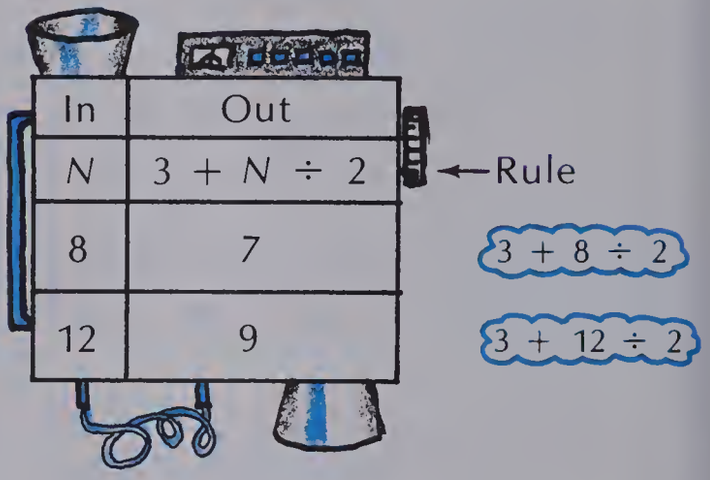


In	Out
N	$5 \times (N + 2)$
6	40
10	60

← Rule

$5 \times (6 + 2)$

$5 \times (10 + 2)$



In	Out
N	$3 + N \div 2$
8	7
12	9

← Rule

$3 + 8 \div 2$

$3 + 12 \div 2$

EXERCISES

Copy and complete.

1.

In	Out
N	$9 + N$
6	
8	
100	

2.

In	Out
N	$N - 11$
15	
21	
60	

3.

In	Out
N	$7 \times N$
4	
9	
50	

Copy. Use order of operations to complete these.

4.

In	Out
N	$(20 - N) \times 2$
12	
9	
4	

5.

In	Out
N	$(N \times 5) + 3$
6	
9	
20	

6.

In	Out
N	$6 + N \div 3$
6	
12	
21	

PRACTICE

Copy and complete.

1.

In	Out
N	$15 + N$
8	
16	
28	

2.

In	Out
N	$38 - N$
11	
17	
29	

3.

In	Out
N	$N \times 8$
5	
12	
30	

4.

In	Out
N	$N \div 6$
24	
42	
540	

5.

In	Out
N	$52 - N$
9	
18	
29	

6.

In	Out
N	$60 \div N$
2	
4	
5	

Copy. Use order of operations to complete these.

7.

In	Out
N	$(N + 3) \times 6$
2	
5	
8	

8.

In	Out
N	$5 \times N - 4$
6	
9	
20	

9.

In	Out
N	$(N + 9) \times 7$
1	
2	
11	

10.

In	Out
N	$48 \div (N + 3)$
3	
5	
9	

11.

In	Out
N	$N \times 4 \div 2$
8	
20	
60	

12.

In	Out
N	$(N \div 5) + 3$
15	
40	
100	

Roman Numerals

I = 1 V = 5 X = 10 L = 50 C = 100 D = 500 M = 1000

Write these Roman numerals in standard form.

a.

b.

c.

d.

e.

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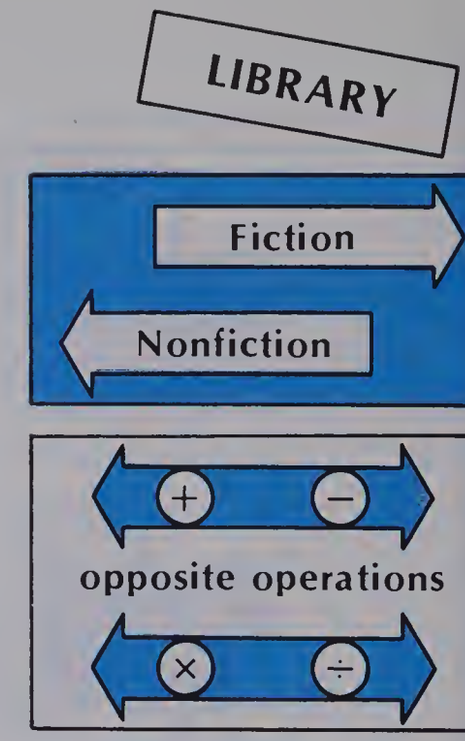
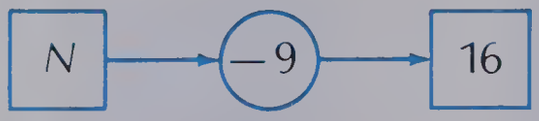
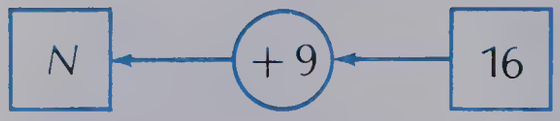
Solving Equations



$N - 9 = 16$ is an equation. It is read as:
"Some number minus 9 equals 16."



Use the **opposite flowchart** to find the **opposite equation**.



$16 + 9 = N$ is the opposite equation of $N - 9 = 16$.

$N = 25$

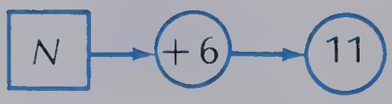
25 solves the equation $N - 9 = 16$.

To check, replace N with 25: $25 - 9 = 16$.

EXERCISES

Find the opposite flowchart and opposite equation.
Solve the equation. Check the solution.

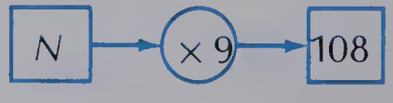
1. $6 + N = 11$



2. $N \div 2 = 12$

3. $N - 17 = 12$

4. $9 \times N = 108$



5. $N \times 6 = 90$

6. $N \div 8 = 4$

7. $9 + N = 32$

8. $7 \times N = 56$

PRACTICE

Solve. Check.

1. $8 + N = 71$ **2.** $N - 28 = 4$ **3.** $N \times 3 = 36$

4. $N \div 9 = 8$ **5.** $N - 45 = 29$ **6.** $N \div 8 = 6$

7. $62 + N = 80$ **8.** $30 \times N = 150$ **9.** $N \div 4 = 25$

10. $N - 85 = 17$ **11.** $18 + N = 92$ **12.** $N \times 12 = 24$

Solve the equations to decode a message below.

13. $20 \times \boxed{E} = 60$ **14.** $27 + \boxed{I} = 104$ **15.** $\boxed{Q} - 19 = 27$

16. $\boxed{A} \div 3 = 47$ **17.** $\boxed{N} \times 56 = 504$ **18.** $25 \times \boxed{U} = 200$

19. $15 \times \boxed{U} = 120$ **20.** $\boxed{O} \div 9 = 25$ **21.** $\boxed{S} \times 99 = 198$

22. $\boxed{T} - 85 = 102$ **23.** $\boxed{E} \times 51 = 153$ **24.** $\boxed{R} \div 32 = 8$

25. $\boxed{N} + 195 = 204$ **26.** $\boxed{F} - 75 = 113$ **27.** $\boxed{A} - 58 = 83$

3	46	8	141	187	77	225	9	2		141	256	3		188	8	9	!

Write the equation. Solve.

28. A number divided by 11 equals 12.

29. 18 times a number equals 90.

30. A number minus 47 equals 48.

31. 235 plus a number equals 604.

Squares and Odds

Copy and fill in the missing numbers.
You will see how the square numbers and odd numbers are related.

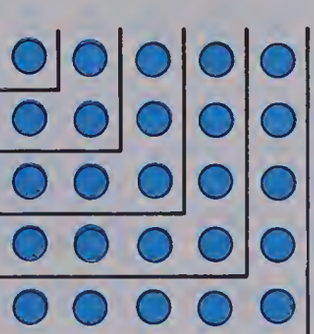
$1^2 = 1$

$2^2 = 1 + \blacksquare$

$3^2 = 1 + 3 + \blacksquare$

$4^2 = 1 + 3 + 5 + \blacksquare$

$5^2 = 1 + \blacksquare + \blacksquare + \blacksquare + \blacksquare$



Try to go to 10.

Equations

Jack bought a book for $1.95. He had $3.15 left to spend. How much did he have at first?

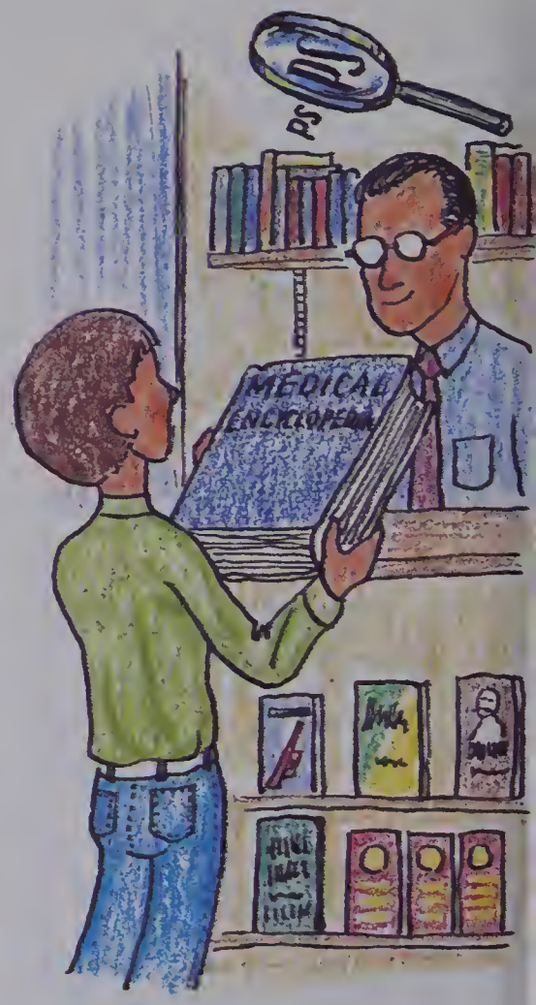
$1.95 spent
$3.15 left

N is the money he had at first.

$$N - 1.95 = 3.15$$

$$N - 1.95 = 3.15$$
$$N = 3.15 + 1.95$$
$$N = 5.10$$

Jack had $5.10 at first.



EXERCISES

Write an equation for each situation.

1. N dollars are in the bank. $550 is deposited. Now there is $850 in the bank.
2. Tim had N pencils. Then 3 were lost. Now 4 are left.
3. In Mrs. Bodner's class there are 18 girls and N boys. There are 39 children altogether.
4. There are 10 floors in a building with N apartments on each floor. The building has 50 apartments in all.
5. A store had N quartz watches at the beginning of a one day sale. Seven watches were sold and 5 watches are left.
6. When 15 is subtracted from a number, the result is 37.
7. Twenty-six times N is 364.
8. A number divided by 3 is 17.

PRACTICE

Write an equation for each and solve it.

1. At the book fair, Meegan bought 12 paperbacks. Eight of these were mysteries and the rest were science fiction. How many were science fiction?
2. A fee of 25¢ per day is charged for overdue library books. If Tom paid $1.50, how many days was his book overdue?
3. Twelve more than a certain number is equal to 56. What is the number?
4. Fifty-six is 12 more than what number?
5. What number added to 35 gives 49?
6. Nine subtracted from what number gives 56?
7. What number when divided by 6 gives 15?
8. Seven times what number is 210?

REVIEW

A30 Copy and simplify each expression.

1. $17 - 8 \times 2$
2. $50 + 8 \div 2 - 10$

A31

3. $(21 \div 3) + (6 \times 7)$
4. $46 \times (98 - 98)$

A32 Copy and complete.

5.

In	Out
N	$75 - N$
29	
17	
36	

6.

In	Out
N	$48 \div (N \times 2)$
8	
12	
24	

7.

In	Out
N	$80 - N \times 5$
6	
12	
16	

A33 Solve for N. Check.

8. $N - 45 = 27$
9. $N \div 8 = 11$
10. $64 + N = 100$

TEST UNIT 6

List the multiples for each. Find the LCM.

1. 6 and 9 **2.** 6 and 8 **3.** 12 and 16

Is 2314 divisible by:

4. 10? **5.** 2? **6.** 3? **7.** 4? **8.** 9?

Is 708 divisible by:

9. 10? **10.** 2? **11.** 3? **12.** 4? **13.** 5?

List the factors for each. Find the GCF.

14. 15 and 30 **15.** 28 and 35 **16.** 26 and 39

Write **prime** or **composite**.

17. 12 **18.** 13 **19.** 51 **20.** 52 **21.** 83

Make a factor tree to express each number as a product of prime factors. Write the product using exponents.

22. 28 **23.** 36 **24.** 200 **25.** 300 **26.** 108

Copy and simplify each expression.

27. $40 + 9 \times 5$ **28.** $33 - 12 + 10 \div 2$

29. $92 \div (6 - 4)$ **30.** $(7 + 2) \div (19 - 16)$

Solve for N. Check.

31. $N - 100 = 37$ **32.** $N \div 25 = 8$ **33.** $6 \times N = 90$

Copy and complete.

34.

In	Out
N	$86 + N$
9	
26	
104	

35.

In	Out
N	$48 \div (N \times 2)$
3	
6	
8	

36.

In	Out
N	$16 + N \div 5$
10	
25	
40	

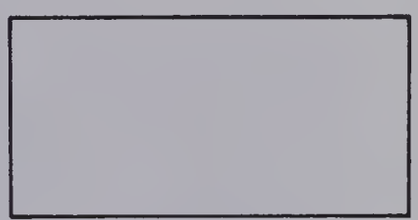
LOOKING BACK

MEASUREMENT

What is the best unit of length for measuring each object?

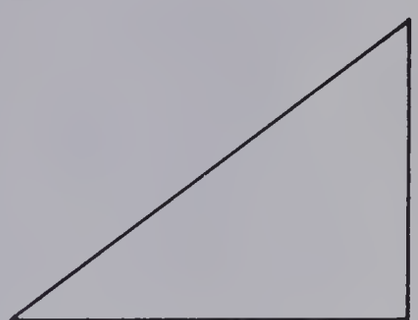
1. thickness of a book
2. width of a book cover
3. height of a tree
4. length of a bus trip

Answer the questions for the rectangle shown.



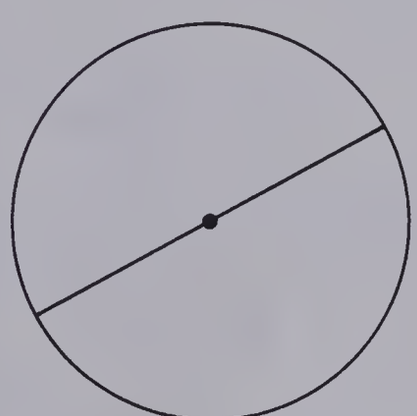
5. Measure the length.
6. Measure the width.
7. What is the area?

Answer these questions for the triangle.



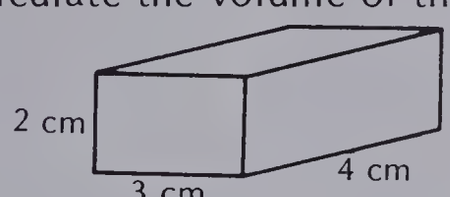
8. Measure the base.
9. Measure the height.
10. What is the area?

Answer these questions for the circle. (Pi = 3.14)



11. Measure the diameter.
12. What is the radius?
13. What is the circumference?
14. What is the area?

15. Calculate the volume of the box.



Copy and complete.

16. 3 kg = ■ g
17. 6000 kg = ■ t
18. 2.5 t = ■ kg
19. 8 L = ■ mL
20. 2500 mL = ■ L
21. 5000 L = ■ kL

22. John started reading at 10:45. He had to stop at 13:15 to run an errand for his mother. For how long did he read?

UNIT 7
FRACTIONS

Forward, March!

During the football half-time show, six school bands marched on the field in different formations. There were 18 members in each band.

1. Write 18 as the product of a pair of factors for each formation.

2. What rectangular formations can be made by 36 members?

3. How many formations can be made by only 9 players?

4. Complete the table below to predict how many formations can be made by 72 players and 144 players. Check your predictions by listing all the pairs of factors.

Players	9	18	36	72	144
Formations	?	6	?	?	?

Fractions

$\frac{1}{3}$ of the drum is blue.

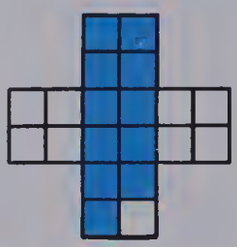
3 of the 5 brass players play trumpets.

$\frac{\text{1 blue part}}{\text{3 parts in all}}$ $\frac{1}{3}$ numerator denominator $\frac{3}{5}$ $\frac{\text{3 trumpet players}}{\text{5 brass players}}$

EXERCISES

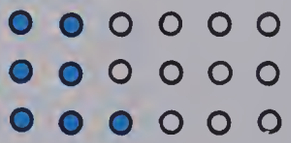
What fraction of the figure is shaded?

1.

2. 

3.

What fraction of the set is shaded?

4. 

5.

6.

7.

8.

9.

Draw a rectangle and shade it to show the fraction.

10. $\frac{3}{8}$ 11. $\frac{5}{6}$ 12. $\frac{7}{10}$ 13. $\frac{1}{5}$ 14. $\frac{8}{9}$

PRACTICE

What fraction of the figure is shaded?

1.

2.

3.

What fraction of the set is shaded?

4.

5.

6.

What fraction of the piano keys shown in the figure is black?

7.

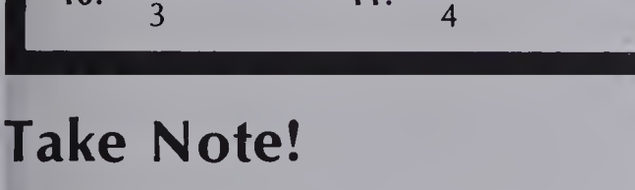
8.

9.

Draw a rectangle and shade it to show the fraction.

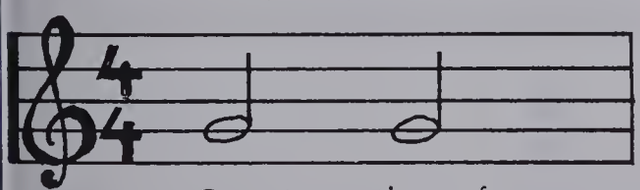
10. $\frac{1}{3}$ 11. $\frac{3}{4}$ 12. $\frac{1}{8}$ 13. $\frac{4}{5}$ 14. $\frac{3}{10}$

Take Note!



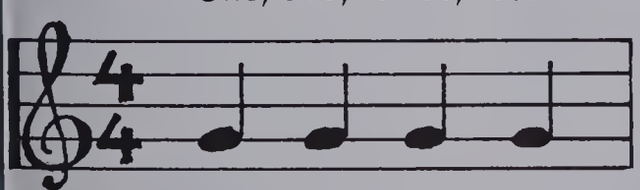
One, two, three, four

Whole note



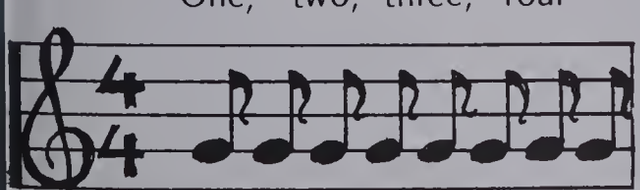
One, two, three, four

Half notes



One, two, three, four

Quarter notes



One, two, three, four

Eighth notes

One whole note has the same time value as:

a. how many half notes?
b. how many quarter notes?
c. how many eighth notes?

One half note has the same time value as:

d. how many quarter notes?
e. how many eighth notes?

Equivalent Fractions

24 members are in the chorus.
$\frac{1}{8}$ of them wear glasses.
How many wear glasses?

One way to solve this is by finding an **equivalent fraction**.

$$\frac{1}{8} = \frac{1 \times 3}{8 \times 3} = \frac{3}{24}$$

Three members of the chorus wear glasses.

> To find an equivalent fraction, multiply both the numerator and denominator by the same number.

EXERCISES

Copy and complete.

1. $\frac{1}{4} = \frac{1 \times 2}{4 \times 2} = \frac{\blacksquare}{\blacksquare}$
2. $\frac{1}{4} = \frac{1 \times 3}{4 \times 3} = \frac{\blacksquare}{\blacksquare}$
3. $\frac{1}{4} = \frac{1 \times 4}{4 \times 4} = \frac{\blacksquare}{\blacksquare}$
4. $\frac{1}{5} = \frac{1 \times 2}{5 \times 2} = \frac{\blacksquare}{\blacksquare}$
5. $\frac{1}{5} = \frac{1 \times 5}{5 \times 5} = \frac{\blacksquare}{\blacksquare}$
6. $\frac{1}{5} = \frac{1 \times 10}{5 \times 10} = \frac{\blacksquare}{\blacksquare}$
7. $\frac{2}{3} = \frac{2 \times 3}{3 \times 3} = \frac{\blacksquare}{\blacksquare}$
8. $\frac{2}{3} = \frac{2 \times 5}{3 \times 5} = \frac{\blacksquare}{\blacksquare}$
9. $\frac{2}{3} = \frac{2 \times 6}{3 \times 6} = \frac{\blacksquare}{\blacksquare}$
10. $\frac{5}{7} = \frac{5 \times \blacksquare}{7 \times \blacksquare} = \frac{20}{28}$
11. $\frac{2}{5} = \frac{2 \times \blacksquare}{5 \times \blacksquare} = \frac{4}{10}$
12. $\frac{3}{8} = \frac{3 \times \blacksquare}{8 \times \blacksquare} = \frac{9}{24}$
13. $\frac{1}{2} = \frac{\blacksquare}{10}$
14. $\frac{3}{4} = \frac{\blacksquare}{8}$
15. $\frac{3}{10} = \frac{9}{\blacksquare}$
16. $\frac{8}{11} = \frac{16}{\blacksquare}$

PRACTICE

Copy and complete.

1. $\frac{2}{5} = \frac{\blacksquare}{20}$
2. $\frac{5}{9} = \frac{\blacksquare}{36}$
3. $\frac{6}{7} = \frac{\blacksquare}{35}$
4. $\frac{3}{8} = \frac{6}{\blacksquare}$
5. $\frac{3}{5} = \frac{\blacksquare}{15}$
6. $\frac{3}{4} = \frac{18}{\blacksquare}$
7. $\frac{7}{8} = \frac{\blacksquare}{16}$
8. $\frac{1}{7} = \frac{5}{\blacksquare}$
9. $\frac{5}{6} = \frac{\blacksquare}{24}$
10. $\frac{5}{9} = \frac{25}{\blacksquare}$
11. $\frac{7}{12} = \frac{\blacksquare}{36}$
12. $\frac{3}{10} = \frac{21}{\blacksquare}$
13. $\frac{1}{3} = \frac{\blacksquare}{6} = \frac{\blacksquare}{9}$
14. $\frac{1}{6} = \frac{\blacksquare}{12} = \frac{\blacksquare}{18}$
15. $\frac{1}{9} = \frac{\blacksquare}{18} = \frac{\blacksquare}{27}$
16. $\frac{3}{5} = \frac{\blacksquare}{10} = \frac{\blacksquare}{15}$
17. $\frac{7}{8} = \frac{\blacksquare}{16} = \frac{\blacksquare}{24}$
18. $\frac{11}{12} = \frac{\blacksquare}{24} = \frac{\blacksquare}{36}$
19. $\frac{3}{4} = \frac{\blacksquare}{8} = \frac{\blacksquare}{12} = \frac{12}{\blacksquare} = \frac{15}{\blacksquare} = \frac{\blacksquare}{24} = \frac{\blacksquare}{28} = \frac{24}{\blacksquare} = \frac{27}{\blacksquare}$

True or false?

20. $\frac{5}{9} = \frac{25}{54}$
21. $\frac{3}{8} = \frac{27}{72}$
22. $\frac{7}{15} = \frac{21}{30}$
23. $\frac{8}{13} = \frac{24}{39}$
24. $\frac{6}{11} = \frac{30}{66}$
25. $\frac{1}{3} = \frac{17}{51}$

Solve.

26. There are 36 musicians in the orchestra. $\frac{1}{3}$ of them play violin. How many play violin?

Patterns

Write the next three fractions in each pattern.

a. $\frac{1}{2}, \frac{2}{4}, \frac{3}{6}, \blacksquare, \blacksquare, \blacksquare$

b. $\frac{1}{3}, \frac{2}{6}, \frac{3}{9}, \blacksquare, \blacksquare, \blacksquare$

c. $\frac{2}{3}, \frac{4}{6}, \frac{6}{9}, \blacksquare, \blacksquare, \blacksquare$

d. $\frac{2}{5}, \frac{4}{10}, \frac{6}{15}, \blacksquare, \blacksquare, \blacksquare$

e. $\frac{3}{8}, \frac{6}{16}, \frac{9}{24}, \blacksquare, \blacksquare, \blacksquare$

f. $\frac{5}{9}, \frac{10}{18}, \frac{15}{27}, \blacksquare, \blacksquare, \blacksquare$

g. $1, \frac{2}{2}, \frac{4}{4}, \blacksquare, \blacksquare, \blacksquare$

h. $\frac{1}{2}, \frac{2}{4}, \frac{4}{8}, \blacksquare, \blacksquare, \blacksquare$

Simplifying Fractions

To find a simpler equivalent fraction, **divide** the numerator and denominator by the same number.

$$\frac{8}{12} = \frac{8 \div 2}{12 \div 2} = \frac{4}{6}$$

To find an equivalent fraction in simplest terms, use the GCF (Greatest Common Factor) as the divisor.

The factors of 8 are: 1, 2, 4, 8.
The factors of 12 are: 1, 2, 3, 4, 6, 12.

The GCF of 8 and 12 is **4**.

$$\frac{8}{12} = \frac{8 \div 4}{12 \div 4} = \frac{2}{3}$$

$\frac{8}{12}$ of the instruments are violins.

EXERCISES

Find the GCF of each pair.

1. 6 and 8
2. 5 and 10
3. 12 and 18

Copy and complete.

4. $\frac{6}{8} = \frac{6 \div 2}{8 \div 2} = \frac{\blacksquare}{\blacksquare}$
5. $\frac{4}{8} = \frac{4 \div 4}{8 \div 4} = \frac{\blacksquare}{\blacksquare}$
6. $\frac{10}{15} = \frac{10 \div \blacksquare}{15 \div \blacksquare} = \frac{\blacksquare}{\blacksquare}$
7. $\frac{12}{18} = \frac{12 \div \blacksquare}{18 \div \blacksquare} = \frac{\blacksquare}{\blacksquare}$
8. $\frac{9}{12} = \frac{9 \div \blacksquare}{12 \div \blacksquare} = \frac{\blacksquare}{\blacksquare}$
9. $\frac{18}{24} = \frac{18 \div \blacksquare}{24 \div \blacksquare} = \frac{\blacksquare}{\blacksquare}$
10. $\frac{16}{24} = \frac{16 \div \blacksquare}{24 \div \blacksquare} = \frac{\blacksquare}{\blacksquare}$
11. $\frac{14}{21} = \frac{14 \div \blacksquare}{21 \div \blacksquare} = \frac{\blacksquare}{\blacksquare}$
12. $\frac{18}{27} = \frac{18 \div \blacksquare}{27 \div \blacksquare} = \frac{\blacksquare}{\blacksquare}$

Write in simplest terms.

13. $\frac{2}{4}$
14. $\frac{24}{36}$
15. $\frac{8}{16}$
16. $\frac{9}{12}$
17. $\frac{30}{50}$

PRACTICE

Find the GCF of each pair.

1. 20 and 24
2. 28 and 42
3. 18 and 36

Write in simplest terms.

4. $\frac{15}{25}$
5. $\frac{22}{33}$
6. $\frac{4}{12}$
7. $\frac{3}{15}$
8. $\frac{13}{39}$
9. $\frac{5}{15}$
10. $\frac{6}{18}$
11. $\frac{10}{18}$
12. $\frac{10}{25}$
13. $\frac{7}{28}$
14. $\frac{15}{24}$
15. $\frac{9}{36}$
16. $\frac{17}{34}$
17. $\frac{14}{42}$
18. $\frac{24}{36}$
19. $\frac{8}{14}$
20. $\frac{30}{36}$
21. $\frac{9}{21}$
22. $\frac{24}{32}$
23. $\frac{35}{56}$

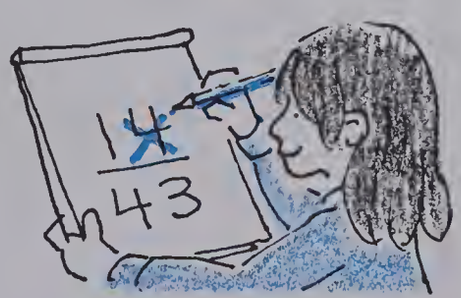
Which fractions **cannot** be simplified?

24. $\frac{2}{6}, \frac{4}{12}, \frac{3}{5}$
25. $\frac{5}{7}, \frac{3}{4}, \frac{20}{25}$
26. $\frac{9}{16}, \frac{4}{9}, \frac{21}{24}$
27. $\frac{8}{21}, \frac{11}{28}, \frac{1}{4}$
28. $\frac{5}{30}, \frac{7}{25}, \frac{20}{21}$
29. $\frac{23}{30}, \frac{6}{41}, \frac{8}{29}$

Answer using a fraction in simplest terms.

30. There were 23 players at band practice.
Four players were absent.
There are 9 trumpets in the band.
What fraction of the band play trumpet?

Odd Fractions



Ellen discovered an easy way to simplify fractions.
Study these:

$$\frac{26}{65} = \frac{2}{5} \qquad \frac{19}{95} = \frac{1}{5}$$

Does Ellen's method always work?

$\frac{14}{43}$ does not equal $\frac{1}{3}$.

Does the shortcut work for these?

$$\frac{16}{64}, \frac{17}{75}, \frac{17}{72}, \frac{13}{35}, \frac{13}{39}, \frac{49}{98}, \frac{12}{21}, \frac{12}{24}$$

Comparing Fractions

Which is greater, $\frac{2}{5}$ or $\frac{3}{10}$?

$$\frac{2}{5} = \frac{2 \times 2}{5 \times 2} = \frac{4}{10}$$

$$\frac{4}{10} > \frac{3}{10} \text{ so, } \frac{2}{5} > \frac{3}{10}$$

$$\frac{2}{5} = \frac{4}{10} > \frac{3}{10}$$

So $\frac{2}{5} > \frac{3}{10}$

Compare fractions with the same denominator.

EXERCISES

Copy and complete. Write $<$ or $>$.

1. $\frac{6}{7} \bullet \frac{3}{7}$

2. $\frac{3}{5} \bullet \frac{5}{5}$

3. $\frac{9}{12} \bullet \frac{11}{12}$

4. $\frac{7}{8} \bullet \frac{5}{8}$

5.

$\frac{1}{3} = \frac{\blacksquare}{6}$

$\frac{1}{3} \bullet \frac{3}{6}$

6.

$\frac{1}{4} = \frac{\blacksquare}{8}$

$\frac{1}{4} \bullet \frac{3}{8}$

7. $\frac{1}{2} = \frac{\blacksquare}{4}$

$\frac{1}{2} \bullet \frac{1}{4}$

8. $\frac{2}{3} = \frac{\blacksquare}{9}$

$\frac{2}{3} \bullet \frac{7}{9}$

9. $\frac{1}{2} = \frac{\blacksquare}{8}$

$\frac{1}{2} \bullet \frac{5}{8}$

10. $\frac{3}{4} = \frac{\blacksquare}{8}$

$\frac{3}{4} \bullet \frac{5}{8}$

11. $\frac{2}{3} \bullet \frac{5}{6}$

12. $\frac{5}{9} \bullet \frac{9}{18}$

13. $\frac{3}{5} \bullet \frac{11}{15}$

14. $\frac{6}{7} \bullet \frac{17}{21}$

Write an equivalent fraction in twelfths for each one. Then write the original fractions in order, starting with the least.

15. $\frac{1}{2}, \frac{1}{6}, \frac{3}{4}, \frac{2}{3}, \frac{1}{4}, \frac{1}{3}, \frac{5}{6}$

PRACTICE

Copy and complete. Write $>$ or $<$.

1. $\frac{4}{7} \bullet \frac{5}{21}$
2. $\frac{2}{3} \bullet \frac{8}{9}$
3. $\frac{3}{5} \bullet \frac{17}{35}$
4. $\frac{4}{9} \bullet \frac{7}{18}$
5. $\frac{5}{12} \bullet \frac{11}{24}$
6. $\frac{1}{4} \bullet \frac{5}{16}$
7. $\frac{9}{10} \bullet \frac{91}{100}$
8. $\frac{4}{5} \bullet \frac{7}{10}$
9. $\frac{3}{8} \bullet \frac{7}{72}$
10. $\frac{7}{10} \bullet \frac{69}{100}$
11. $\frac{9}{100} \bullet \frac{1}{10}$
12. $\frac{3}{5} \bullet \frac{5}{10}$

Write equivalent fractions with the given denominator.

13. denominator 24
    $\frac{1}{6}, \frac{3}{8}, \frac{1}{4}$
14. denominator 32
    $\frac{3}{4}, \frac{5}{8}, \frac{9}{16}$
15. denominator 48
    $\frac{5}{12}, \frac{1}{6}, \frac{1}{16}$

Write the fractions in order, from least to greatest.

16. $\frac{9}{12}, \frac{3}{4}, \frac{2}{3}, \frac{5}{6}, \frac{1}{2}$
17. $\frac{17}{28}, \frac{6}{7}, \frac{3}{4}, \frac{1}{2}, \frac{11}{14}$

REVIEW

N11

Draw a rectangle and shade it to show the fraction.

1. $\frac{3}{5}$
2. $\frac{5}{8}$
3. $\frac{9}{10}$
4. $\frac{11}{11}$

A34

Copy and complete.

5. $\frac{3}{7} = \frac{\blacksquare}{28}$
6. $\frac{5}{9} = \frac{\blacksquare}{18}$
7. $\frac{2}{3} = \frac{8}{\blacksquare}$

A35

Write in simplest terms.

8. $\frac{15}{24}$
9. $\frac{20}{35}$
10. $\frac{12}{36}$
11. $\frac{18}{24}$

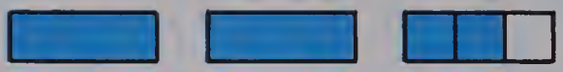
N12

Copy and complete. Write $<$ or $>$.

12. $\frac{3}{4} \bullet \frac{5}{8}$
13. $\frac{7}{10} \bullet \frac{29}{40}$
14. $\frac{2}{11} \bullet \frac{5}{33}$

Mixed Numerals

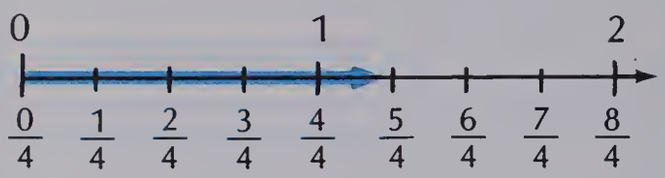
$$1 + \frac{1}{4} = 1\frac{1}{4}$$

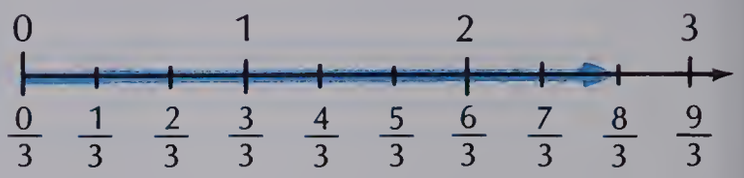


$$1 + 1 + \frac{2}{3} = 2\frac{2}{3}$$

$$\frac{4}{4} + \frac{1}{4} = \frac{5}{4}$$

$$\frac{3}{3} + \frac{3}{3} + \frac{2}{3} = \frac{8}{3}$$





$\frac{5}{4} = 1\frac{1}{4}$ — fraction, mixed numeral

$\frac{8}{3} = 2\frac{2}{3}$ — fraction, mixed numeral

EXERCISES

Change the mixed numeral to a fraction.

1. $1\frac{2}{5} = \frac{\blacksquare}{5}$

2. $1\frac{1}{6} = \frac{\blacksquare}{6}$

3. $2\frac{2}{3} = \frac{\blacksquare}{3}$

4. $1\frac{3}{4} = \frac{\blacksquare}{\blacksquare}$

5. $2\frac{5}{6} = \frac{\blacksquare}{\blacksquare}$

6. $2\frac{3}{7} = \frac{\blacksquare}{\blacksquare}$

7. $3\frac{1}{2} = \frac{\blacksquare}{2}$

8. $9\frac{3}{4} = \frac{\blacksquare}{4}$

9. $5\frac{6}{7} = \frac{\blacksquare}{7}$

10. $2\frac{3}{5} = \frac{\blacksquare}{5}$

11. $7\frac{1}{3} = \frac{\blacksquare}{\blacksquare}$

12. $4\frac{5}{8} = \frac{\blacksquare}{\blacksquare}$

13. $2\frac{1}{3} = \frac{\blacksquare}{\blacksquare}$

14. $5\frac{1}{2} = \frac{\blacksquare}{\blacksquare}$

15. $3\frac{7}{10}$

16. $4\frac{2}{5}$

17. $6\frac{5}{8}$

18. $3\frac{4}{7}$

19. $5\frac{1}{9}$

20. $4\frac{4}{6}$

21. $7\frac{2}{8}$

22. $9\frac{5}{7}$

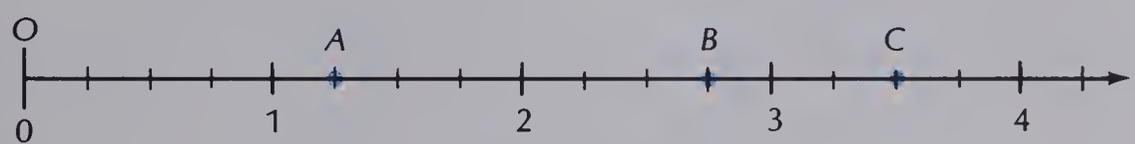
PRACTICE

Change the mixed numeral to a fraction.

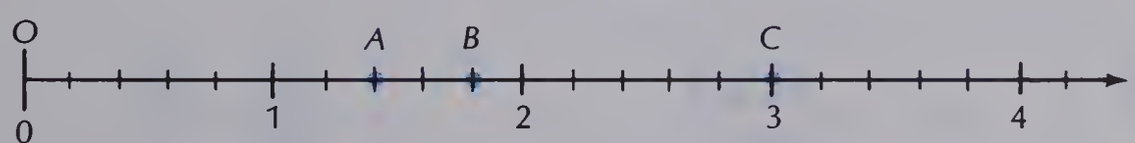
1. $2\frac{1}{2} = \frac{\blacksquare}{2}$
2. $3\frac{2}{3} = \frac{\blacksquare}{3}$
3. $5\frac{3}{4} = \frac{\blacksquare}{4}$
4. $4\frac{1}{4} = \frac{\blacksquare}{4}$
5. $1\frac{2}{3} = \frac{5}{\blacksquare}$
6. $7\frac{1}{5} = \frac{\blacksquare}{5}$
7. $1\frac{4}{7} = \frac{11}{\blacksquare}$
8. $8\frac{1}{2} = \frac{\blacksquare}{2}$
9. $2\frac{5}{7}$
10. $3\frac{4}{5}$
11. $4\frac{2}{3}$
12. $6\frac{1}{9}$
13. $7\frac{2}{9}$
14. $10\frac{3}{5}$
15. $1\frac{3}{4}$
16. $5\frac{3}{8}$
17. $5\frac{3}{100}$
18. $3\frac{2}{25}$
19. $2\frac{7}{40}$
20. $6\frac{5}{11}$

Write a mixed numeral for the length of *OA*, *OB*, and *OC*.

21.



22.



23. A long-playing record spins $33\frac{1}{3}$ times every minute. Write this as a fraction.

It's about time...

Four students recorded the length of their band concert. Are the lengths the same?

Katia	$1\frac{3}{4}$ h
Ravinder	105 min
Nina	1 h 45 min
Ted	7 quarter-hours

Write each in 3 different ways.

a. $2\frac{1}{4}$ h
b. 90 min
c. 3 h 15 min

Mixed Numerals

Can you write $\frac{13}{5}$ as a mixed numeral?

Draw a figure.

$$\frac{13}{5} = 1 + 1 + \frac{3}{5} = 2\frac{3}{5}$$

Divide.

$$\frac{13}{5} \longrightarrow 5\overline{)13} \longrightarrow 2\frac{3}{5}$$

$$\begin{array}{r} 2 \\ 5\overline{)13} \\ \underline{10} \\ 3 \end{array}$$

Write the remainder as a fraction.

EXERCISES

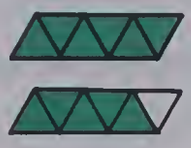
Write the fraction as a mixed numeral.

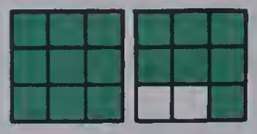
1. $\frac{9}{4} = \blacksquare$

2. $\frac{5}{3} = \blacksquare$

3. $\frac{11}{8} = \blacksquare$

4. $\frac{13}{5} = \blacksquare$

5.  $\frac{11}{6} = \blacksquare$

6.  $\frac{16}{9} = \blacksquare$

Use division to change the fraction to a mixed numeral.

7. $\frac{5}{3}$	8. $\frac{9}{4}$	9. $\frac{16}{7}$	10. $\frac{18}{5}$	11. $\frac{25}{8}$
12. $\frac{11}{4}$	13. $\frac{9}{2}$	14. $\frac{29}{10}$	15. $\frac{12}{5}$	16. $\frac{45}{7}$
17. $\frac{61}{9}$	18. $\frac{42}{8}$	19. $\frac{16}{7}$	20. $\frac{29}{5}$	21. $\frac{65}{6}$
22. $\frac{42}{8}$	23. $\frac{72}{9}$	24. $\frac{45}{4}$	25. $\frac{53}{10}$	26. $\frac{34}{5}$

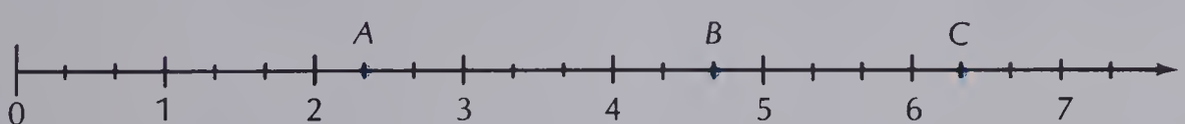
PRACTICE

Use division to change the fraction to a mixed numeral.

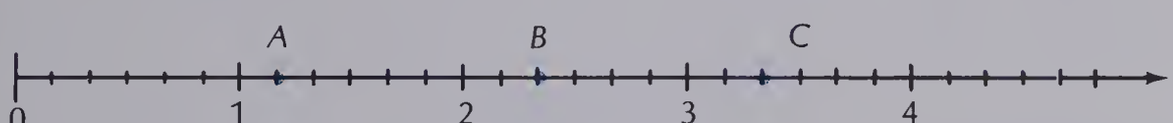
1. $\frac{15}{6}$	**2.** $\frac{8}{3}$	**3.** $\frac{32}{4}$	**4.** $\frac{27}{5}$	**5.** $\frac{35}{5}$
6. $\frac{25}{8}$	**7.** $\frac{17}{12}$	**8.** $\frac{22}{7}$	**9.** $\frac{42}{6}$	**10.** $\frac{52}{8}$
11. $\frac{41}{6}$	**12.** $\frac{38}{3}$	**13.** $\frac{15}{7}$	**14.** $\frac{28}{4}$	**15.** $\frac{26}{3}$
16. $\frac{48}{5}$	**17.** $\frac{21}{2}$	**18.** $\frac{49}{6}$	**19.** $\frac{33}{10}$	**20.** $\frac{35}{6}$
21. $\frac{80}{9}$	**22.** $\frac{74}{6}$	**23.** $\frac{88}{7}$	**24.** $\frac{101}{10}$	**25.** $\frac{100}{11}$

What mixed numeral corresponds to *A*? to *B*? to *C*?

26.



27.



28. **Pi** is a special number used to calculate the circumference and area of a circle.

Pi is about $\frac{22}{7}$. Write $\frac{22}{7}$ as a mixed numeral.

Division — 3 Ways

Division can be written three ways.

Using ÷	Using ⟌	As a fraction
$29 \div 8$	$8\overline{)29}$	$\frac{29}{8}$

Write each expression two other ways.

a. $26 \div 9$ **b.** $7\overline{)48}$ **c.** $\frac{56}{5}$ **d.** $100 \div 71$ **e.** $\frac{638}{51}$

Fractions and Decimals

A survey of the Grade 6 class showed that $\frac{2}{5}$ of the students play an instrument and $\frac{5}{8}$ of the students would like to be in the school band. Express these fractions as decimals.

Method 1

Change to a fraction in tenths or hundredths. Then write as a decimal.

$$\frac{2}{5} = \frac{2 \times 2}{5 \times 2} = \frac{4}{10}$$

$$\frac{4}{10} = 0.4$$

Method 2

Divide.

$$\begin{array}{r} 0.625 \\ 8\overline{)5.000} \\ -48 \\ \hline 20 \\ -16 \\ \hline 40 \\ -40 \\ \hline 0 \end{array}$$

EXERCISES

Write as a decimal.

1. $\frac{2}{10}$ **2.** $\frac{6}{10}$ **3.** $\frac{21}{100}$ **4.** $\frac{7}{100}$ **5.** $\frac{35}{100}$

Write as a fraction with a denominator of 10 and as a decimal.

6. $\frac{1}{5} = \frac{\blacksquare}{10} = \blacksquare$ **7.** $\frac{1}{2} = \frac{\blacksquare}{10} = \blacksquare$ **8.** $\frac{7}{5} = \frac{\blacksquare}{10} = \blacksquare$ **9.** $\frac{5}{2} = \frac{\blacksquare}{10} = \blacksquare$

Write as a fraction with a denominator of 100 and as a decimal.

10. $\frac{3}{20} = \frac{\blacksquare}{100} = \blacksquare$ **11.** $\frac{19}{50} = \frac{\blacksquare}{100} = \blacksquare$ **12.** $\frac{52}{50} = \frac{\blacksquare}{100} = \blacksquare$

Use division to change the fraction to a decimal.

13. $\frac{3}{50}$ **14.** $\frac{7}{8}$ **15.** $\frac{7}{4}$ **16.** $\frac{9}{40}$ **17.** $\frac{36}{80}$

18. $\frac{26}{25}$ **19.** $\frac{3}{20}$ **20.** $\frac{17}{25}$ **21.** $\frac{17}{20}$ **22.** $\frac{34}{50}$

PRACTICE

Write as a fraction with a denominator of 10 or 100.
Then write as a decimal.

1. $\frac{2}{5}$	**2.** $\frac{1}{2}$	**3.** $\frac{8}{25}$	**4.** $\frac{13}{50}$	**5.** $\frac{9}{20}$
6. $\frac{7}{2}$	**7.** $\frac{9}{5}$	**8.** $\frac{23}{50}$	**9.** $\frac{21}{25}$	**10.** $\frac{19}{20}$
11. $\frac{47}{50}$	**12.** $\frac{31}{50}$	**13.** $\frac{32}{25}$	**14.** $\frac{27}{20}$	**15.** $\frac{17}{5}$
16. $\frac{61}{50}$	**17.** $\frac{14}{20}$	**18.** $\frac{8}{5}$	**19.** $\frac{18}{25}$	**20.** $\frac{5}{4}$

Use division to change the fraction to a decimal.

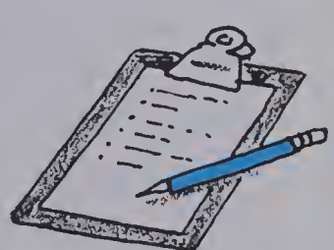
21. $\frac{5}{8}$	**22.** $\frac{30}{16}$	**23.** $\frac{11}{40}$	**24.** $\frac{9}{20}$	**25.** $\frac{24}{64}$
26. $\frac{5}{625}$	**27.** $\frac{27}{40}$	**28.** $\frac{32}{80}$	**29.** $\frac{8}{11}$	**30.** $\frac{23}{30}$

Write as a fraction.

31. 0.95	**32.** 0.8	**33.** 0.709	**34.** 0.1135
35. 0.4	**36.** 0.05	**37.** 0.017	**38.** 0.0006

39. A survey of 20 students showed that $\frac{3}{4}$ of the students had at least one record. $\frac{3}{5}$ had at least two records and $\frac{7}{20}$ had more than five. Write the survey results in decimal form.

What's the Score?



Take a survey of the musical interests of 8 students.
Express the results in decimal form in a chart.

Do you like to sing? Do you play a musical instrument?
What instrument do you play? Would you like to be in a band or orchestra?
Would you like to sing in a musical performance?

Part of a Set

$\frac{1}{3}$ of the instruments in the orchestra are woodwinds.

$\frac{1}{3}$ of 15 **or** $\frac{1}{3} \times 15$ **equals** $\frac{15}{3} = 5$

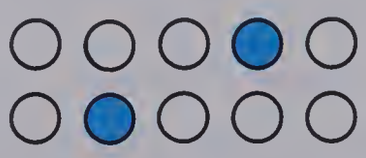
5 of the instruments are woodwinds.

EXERCISES

Copy and complete.

1.

$\frac{1}{3}$ of 6 = ■

2. 

$\frac{1}{5}$ of 10 = ■

3.

$\frac{1}{3}$ of 12 = ■

4. $\frac{1}{9} \times 18 = \frac{18}{9} =$ ■

5. $\frac{1}{4} \times 16 = \frac{16}{4} =$ ■

6. $\frac{1}{6} \times 30 = \frac{30}{6} =$ ■

7. $\frac{1}{10} \times 20 = \frac{■}{■} =$ ■

8. $\frac{1}{8} \times 24 = \frac{■}{■} =$ ■

9. $\frac{1}{7} \times 7 = \frac{■}{■} =$ ■

Multiply.

10. $\frac{1}{2} \times 18$

11. $\frac{1}{10} \times 30$

12. $\frac{1}{6} \times 12$

13. $\frac{1}{5} \times 20$

14. $\frac{1}{4} \times 48$

15. $\frac{1}{7} \times 35$

16. $\frac{1}{20} \times 80$

17. $\frac{1}{25} \times 75$

PRACTICE

Copy and complete.

1. $\frac{1}{5} \times 25 = \frac{25}{5} = \blacksquare$
2. $\frac{1}{7} \times 56 = \frac{56}{7} = \blacksquare$
3. $\frac{1}{3} \times 24 = \frac{24}{3} = \blacksquare$
4. $\frac{1}{9} \times 27 = \frac{27}{9} = \blacksquare$
5. $\frac{1}{12} \times 36 = \frac{36}{12} = \blacksquare$
6. $\frac{1}{8} \times 32 = \frac{32}{8} = \blacksquare$

Multiply.

7. $\frac{1}{4} \times 44$
8. $\frac{1}{6} \times 72$
9. $\frac{1}{5} \times 45$
10. $\frac{1}{7} \times 49$
11. $\frac{1}{3} \times 21$
12. $\frac{1}{2} \times 120$
13. $\frac{1}{9} \times 72$
14. $\frac{1}{4} \times 28$
15. $\frac{1}{5} \times 55$
16. $\frac{1}{8} \times 64$
17. $\frac{1}{10} \times 150$
18. $\frac{1}{2} \times 44$
19. $\frac{1}{4} \times 60$
20. $\frac{1}{5} \times 75$
21. $\frac{1}{8} \times 80$
22. $\frac{1}{12} \times 84$

Solve.

23. Grade 6 students sold 556 tickets for the school play. One half of the tickets were for the opening night. How many tickets did they sell for opening night?

24. Gerard practises the piano for 45 min daily. For $\frac{1}{5}$ of this time he practises scales. How long does he practise scales each day?

25. One third of 60 students have radios. How many is that?

Catching Up

Joan's age is $\frac{1}{3}$ of her father's age.
Six years ago, she was $\frac{1}{5}$ of her father's age.
How old is Joan now?

Fraction of a Set

Three fourths of the singers are girls.

$\frac{3}{4}$ of 20 **or** $\frac{3}{4} \times 20$ **equals** $\frac{60}{4} = 15$

15 of the singers are girls.

EXERCISES

Copy and complete.

1. $\frac{1}{4}$ of 8 = ■

$\frac{2}{4}$ of 8 = ■

$\frac{3}{4}$ of 8 = ■

$\frac{4}{4}$ of 8 = ■

2. $\frac{1}{3} \times 12 =$ ■

$\frac{2}{3} \times 12 =$ ■

$\frac{3}{3} \times 12 =$ ■

3. $\frac{1}{5} \times 30 =$ ■

$\frac{2}{5} \times 30 =$ ■

$\frac{3}{5} \times 30 =$ ■

$\frac{4}{5} \times 30 =$ ■

$\frac{5}{5} \times 30 =$ ■

4. $\frac{2}{5} \times 15 = \frac{2 \times 15}{5} = \frac{30}{5} =$ ■

5. $\frac{3}{4} \times 20 = \frac{3 \times 20}{4} = \frac{60}{4} =$ ■

6. $\frac{3}{8} \times 16 = \frac{3 \times 16}{8} = \frac{■}{■} =$ ■

7. $\frac{5}{7} \times 21 = \frac{5 \times 21}{7} = \frac{■}{■} =$ ■

8. $\frac{5}{6} \times 12 = \frac{5 \times 12}{■} = \frac{■}{■} =$ ■

9. $\frac{4}{5} \times 20 = \frac{■ \times ■}{5} = \frac{■}{■} =$ ■

Multiply.

10. $\frac{2}{3} \times 9$ **11.** $\frac{3}{5} \times 25$ **12.** $\frac{2}{7} \times 14$ **13.** $\frac{5}{8} \times 32$

14. $\frac{1}{6} \times 18$ **15.** $\frac{4}{8} \times 32$ **16.** $\frac{1}{7} \times 42$ **17.** $\frac{2}{3} \times 54$

PRACTICE

Multiply.

1. $\frac{3}{5} \times 15$
2. $\frac{3}{8} \times 16$
3. $\frac{4}{7} \times 21$
4. $\frac{7}{8} \times 32$
5. $\frac{7}{10} \times 20$
6. $\frac{5}{6} \times 42$
7. $\frac{2}{9} \times 27$
8. $\frac{4}{5} \times 50$
9. $\frac{3}{7} \times 77$
10. $\frac{3}{4} \times 48$
11. $\frac{2}{3} \times 60$
12. $\frac{3}{5} \times 40$
13. $\frac{5}{8} \times 64$
14. $\frac{7}{9} \times 81$
15. $\frac{2}{5} \times 100$
16. $\frac{6}{7} \times 63$
17. $\frac{4}{5} \times 200$
18. $\frac{3}{8} \times 72$
19. $\frac{5}{6} \times 36$
20. $\frac{5}{9} \times 63$

Solve.

21. There are 120 seats in the auditorium. $\frac{5}{6}$ of them were filled for a recital. How many people attended the recital?

22. Two fifths of the 300 students in Glen Valley School play the guitar. How many students don't play the guitar?

23. A parade route is 36 blocks long. The Brownie Troop is to march only $\frac{2}{3}$ of the distance. For how many blocks will the Brownies march?

USING THE CALCULATOR

A calculator can be used to multiply a whole number by a fraction.

Try $\frac{5}{8} \times 56$. Enter: [5] [×] [56] [=] [÷] [8] [=] .

Round the answers to the nearest whole number.

1. $\frac{3}{4} \times 10$
2. $\frac{3}{8} \times 25$
3. $\frac{5}{16} \times 78$
4. $\frac{2}{3} \times 100$
5. $\frac{2}{7} \times 100$
6. $\frac{4}{9} \times 100$

Problem Solving

There are 35 students in Grade 6. They sold 350 tickets for the spring concert. How much money did they make?

Identify the facts needed.

350 tickets
~~35 students~~

Decide.

Not enough information!

An ensemble has 8 violins, 3 clarinets, 2 cellos, 2 flutes, 1 oboe, 2 violas, and a French horn. How many stringed instruments does it have?

Too much information!

Identify the facts needed.

8 violins
2 cellos
2 violas

$8 + 2 + 2 = 12$

The ensemble has 12 stringed instruments.

EXERCISES

Is there too much information, just enough information, or not enough information?

1. Butter tarts sell for $3.50 a dozen. What is the price of 12 butter tarts packed in 4 rows of 3?

2. How much does it cost to buy 5 pairs of tickets to the school dance?

3. What is the cost of a dozen paperback books if each book costs $1.95?

4. Potatoes cost 30¢/kg. How much does it cost to buy a 5 kg bag containing 20 potatoes?

5. An antique store owner sold a violin for $50 and bought it back for $30. Then she resold it for $40. What is her net gain or loss on the violin?

PRACTICE

Solve only the problems which have all the facts needed.

1. Last Saturday 480 people attended a band concert in Nelson. If everyone came by car, how many cars were in the parking lot?

2. Fanny rents her flea market space for $15 a square metre. How much area should she pay for if her booth is 3 m high, 2 m wide, and 4 m long?

3. Markham High School held their annual concert and charged $2 admission for adults and $1 admission for children. How many adults and children attended the concert if the total receipts were $300?

4. Over a weekend, Cindy's Record Shop sold $1278 worth of records to 120 people and made a profit of $356. She sold 165 LPs and 38 singles. How much did it cost to run the store for the weekend?

REVIEW

N13 Write as a fraction.

1. $5\frac{3}{4}$ **2.** $9\frac{5}{6}$ **3.** $2\frac{4}{5}$ **4.** $6\frac{1}{2}$

N14 Write as a mixed numeral.

5. $\frac{15}{8}$ **6.** $\frac{5}{2}$ **7.** $\frac{11}{3}$ **8.** $\frac{27}{4}$

A36 Write as a decimal.

9. $\frac{9}{10}$ **10.** $\frac{3}{4}$ **11.** $\frac{11}{50}$ **12.** $\frac{16}{25}$

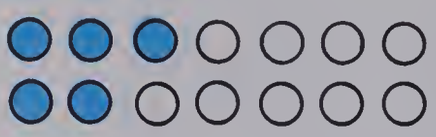
A37 Multiply.

13. $\frac{1}{5} \times 35$ **14.** $\frac{1}{3} \times 42$ **15.** $\frac{1}{8} \times 64$

A38 **16.** $\frac{3}{4} \times 28$ **17.** $\frac{2}{3} \times 30$ **18.** $\frac{5}{9} \times 36$

TEST UNIT 7

What fraction of the set is shaded?

1. 

2.

3.

Copy and complete.

4. $\frac{2}{3} = \frac{10}{\blacksquare}$

5. $\frac{4}{9} = \frac{\blacksquare}{36}$

6. $\frac{1}{5} = \frac{7}{\blacksquare}$

7. $\frac{6}{7} = \frac{\blacksquare}{21}$

Write in simplest terms.

8. $\frac{8}{10}$

9. $\frac{6}{12}$

10. $\frac{18}{21}$

11. $\frac{15}{40}$

12. $\frac{14}{35}$

Copy and complete. Write $>$ or $<$.

13. $\frac{1}{2} \bullet \frac{3}{4}$

14. $\frac{5}{6} \bullet \frac{11}{12}$

15. $\frac{3}{5} \bullet \frac{7}{10}$

16. $\frac{2}{3} \bullet \frac{5}{6}$

Change the mixed numeral to a fraction.

17. $3\frac{1}{2}$

18. $5\frac{2}{3}$

19. $8\frac{1}{4}$

20. $9\frac{2}{5}$

21. $3\frac{5}{8}$

Change the fraction to a mixed numeral.

22. $\frac{15}{7}$

23. $\frac{19}{5}$

24. $\frac{8}{3}$

25. $\frac{21}{10}$

26. $\frac{48}{9}$

Write as a decimal.

27. $\frac{2}{10}$

28. $\frac{79}{100}$

29. $\frac{4}{25}$

30. $\frac{21}{50}$

31. $\frac{3}{8}$

Multiply.

32. $\frac{1}{6} \times 18$

33. $\frac{1}{4} \times 32$

34. $\frac{1}{9} \times 81$

35. $\frac{1}{5} \times 45$

36. $\frac{3}{4} \times 12$

37. $\frac{5}{7} \times 35$

38. $\frac{3}{8} \times 32$

39. $\frac{4}{5} \times 65$

Solve.

40. Only three quarters of the band came to practice. How many of the 36 players were absent?

ING BACK NUMBER THEORY

Find the LCM of each pair of numbers.

1. 4 and 6 **2.** 9 and 12 **3.** 15 and 20

Is 7924 divisible:

4. by 2? **5.** by 3? **6.** by 4? **7.** by 5? **8.** by 6?

Is 5112 divisible:

9. by 4? **10.** by 3? **11.** by 6? **12.** by 9? **13.** by 10?

Find the GCF of each pair of numbers.

14. 12 and 18 **15.** 14 and 21 **16.** 18 and 36

Is the number prime or composite?

17. 2 **18.** 9 **19.** 15 **20.** 30 **21.** 43

Use a factor tree to write each number as a product of prime factors. Write the product using exponents.

22. 15 **23.** 40 **24.** 32 **25.** 36 **26.** 60

Simplify each expression.

27. $70 + 40 \div 5$ **28.** $65 - 18 + 12 \div 4$

29. $48 \div (16 - 4)$ **30.** $(3 + 7) \times (14 - 2)$

What is N? Check your answer.

31. $N - 57 = 38$ **32.** $N \times 15 = 120$ **33.** $N \div 12 = 13$

Copy and complete.

34.

In	Out
N	$N - 24$
61	
92	
108	

35.

In	Out
N	$60 \div (N + 3)$
9	
12	
27	

36.

In	Out
N	$100 - N \div 2$
26	
38	
100	

UNIT 8

MULTIPLICATION WITH FRACTIONS & DECIMALS

Taking Stock

1000 shares
Consolidated Fractions A

Simplify the mixed numeral.

1.	$5\frac{5}{10}$	**2.**	$7\frac{12}{20}$	**3.**	$2\frac{9}{24}$
4.	$5\frac{10}{24}$	**5.**	$3\frac{4}{16}$	**6.**	$3\frac{12}{16}$
7.	$7\frac{27}{30}$	**8.**	$2\frac{20}{24}$	**9.**	$5\frac{8}{24}$
10.	$7\frac{20}{30}$	**11.**	$6\frac{15}{24}$	**12.**	$9\frac{6}{24}$
13.	$8\frac{8}{10}$	**14.**	$4\frac{21}{28}$	**15.**	$1\frac{40}{45}$

1000 shares
Consolidated Fractions B

Write the fraction as a mixed numeral.

1.	$\frac{11}{2}$	**2.**	$\frac{38}{5}$	**3.**	$\frac{19}{8}$
4.	$\frac{65}{12}$	**5.**	$\frac{13}{4}$	**6.**	$\frac{15}{4}$
7.	$\frac{79}{10}$	**8.**	$\frac{17}{6}$	**9.**	$\frac{16}{3}$
10.	$\frac{23}{3}$	**11.**	$\frac{53}{8}$	**12.**	$\frac{37}{4}$
13.	$\frac{44}{5}$	**14.**	$\frac{19}{4}$	**15.**	$\frac{17}{9}$

Multiplying With Fractions

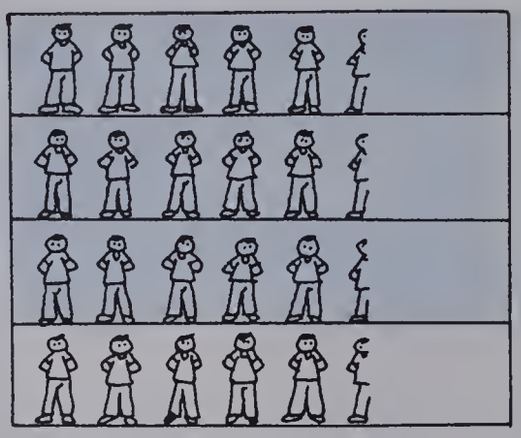
Three fourths of 22 thousand railway workers voted against having a strike. How many thousand railway workers is that?

$\frac{3}{4}$ of 22 = ■

or

$\frac{3}{4} \times 22 = \frac{3 \times 22}{4} = \frac{66}{4} = 16\frac{2}{4} = 16\frac{1}{2}$

22 thousand workers



each represents 1000 railway workers

$16\frac{1}{2}$ thousand (or 16 500) railway workers voted against the strike.

EXERCISES

Multiply. Write the answer as a mixed numeral.

1. $\frac{1}{8}$ of 9 = $\frac{9}{8}$ = ■
2. $9 \times \frac{5}{8} = \frac{9 \times 5}{8}$ = ■
3. $\frac{3}{5}$ of 2 = $\frac{3 \times 2}{5}$ = ■
4. $4 \times \frac{6}{7} = \frac{4 \times 6}{7}$ = ■
5. $\frac{1}{3}$ of 10
6. $\frac{2}{3}$ of 10
7. $\frac{3}{3}$ of 10
8. $\frac{4}{3}$ of 10
9. $\frac{1}{4}$ of 14
10. $\frac{2}{4}$ of 14
11. $\frac{3}{4}$ of 14
12. $\frac{4}{4}$ of 14
13. $3 \times \frac{1}{2}$
14. $3 \times \frac{2}{2}$
15. $3 \times \frac{3}{2}$
16. $3 \times \frac{4}{2}$
17. $\frac{3}{4} \times 6$
18. $\frac{5}{7} \times 12$
19. $5 \times \frac{3}{10}$
20. $8 \times \frac{3}{4}$
21. $\frac{5}{6} \times 7$
22. $\frac{4}{8} \times 5$
23. $\frac{2}{3} \times 6$
24. $\frac{5}{3} \times 8$
25. $\frac{6}{5} \times 4$
26. $\frac{3}{7} \times 7$
27. $\frac{3}{6} \times 8$
28. $\frac{12}{5} \times 4$

PRACTICE

Multiply. Write the answer in simplest terms.

1. $\frac{1}{6}$ of 70	**2.** $\frac{1}{9}$ of 3	**3.** $3 \times \frac{2}{3}$	**4.** $5 \times \frac{1}{10}$
5. $\frac{4}{5} \times 10$	**6.** $\frac{7}{12} \times 4$	**7.** $11 \times \frac{7}{8}$	**8.** $3 \times \frac{2}{9}$
9. $\frac{2}{3} \times 7$	**10.** $\frac{3}{4} \times 24$	**11.** $\frac{5}{5} \times 4$	**12.** $\frac{5}{6} \times 9$
13. $25 \times \frac{7}{10}$	**14.** $15 \times \frac{2}{9}$	**15.** $12 \times \frac{5}{8}$	**16.** $30 \times \frac{1}{12}$
17. $\frac{2}{3} \times 120$	**18.** $\frac{3}{4} \times 200$	**19.** $\frac{7}{8} \times 120$	**20.** $\frac{9}{10} \times 145$
21. $101 \times \frac{3}{2}$	**22.** $60 \times \frac{2}{3}$	**23.** $88 \times \frac{1}{6}$	**24.** $30 \times \frac{7}{9}$
25. $\frac{6}{7} \times 49$	**26.** $85 \times \frac{4}{5}$	**27.** $120 \times \frac{3}{4}$	**28.** $\frac{1}{10} \times 165$

Solve.

29. The average railway worker's salary is $1\frac{1}{4}$ times greater than it was two years ago. What is the average today, if it was 24 thousand dollars two years ago?

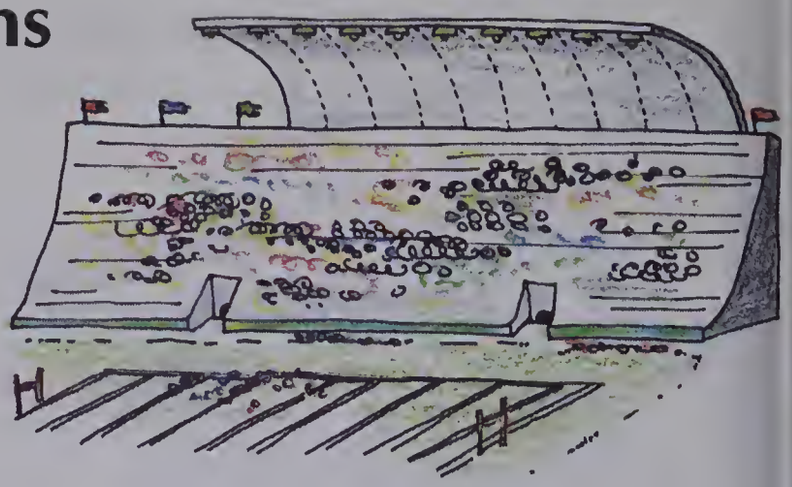
30. There are about 70 000 km of railway track in Canada. About $\frac{1}{5}$ of the track is in Saskatchewan, $\frac{1}{7}$ in Alberta, and $\frac{1}{10}$ in Manitoba. About how many kilometres of track are there in the Prairie Provinces?

Missing Numerators

What is the missing numerator in each fraction?

a. $\frac{\blacksquare}{4} \times 6 = 6$	**b.** $\frac{\blacksquare}{4} \times 6 = 12$	**c.** $\frac{\blacksquare}{4} \times 6 = 0$
d. $\frac{\blacksquare}{7} \times 15 = 15$	**e.** $\frac{\blacksquare}{7} \times 15 = 30$	**f.** $\frac{\blacksquare}{7} \times 15 = 45$
g. $\frac{\blacksquare}{11} \times 2 = 2$	**h.** $\frac{\blacksquare}{11} \times 2 = 4$	**i.** $\frac{\blacksquare}{11} \times 2 = 0$

Multiplying Fractions



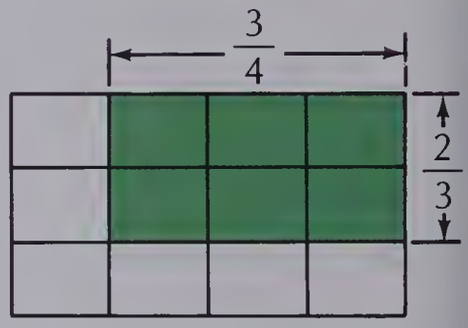
Acme Construction was contracted to build a football stadium.

$\frac{3}{4}$ of the seats are to be between the goal lines.

$\frac{2}{3}$ of **those** seats are to be covered by a roof.

What fraction of all the seats will be covered?

The diagram shows the area covered by the roof is $\frac{6}{12}$ or $\frac{1}{2}$.



We could find this area by multiplying.

$$\frac{2}{3} \times \frac{3}{4} = \frac{2 \times 3}{3 \times 4} = \frac{6}{12} = \frac{1}{2}$$

EXERCISES

Calculate. Write the answer in simplest terms.

1. $\frac{1}{5}$ of $\frac{2}{3} = \frac{1}{5} \times \frac{2}{3} =$ ■

2. $\frac{1}{2}$ of $\frac{4}{5} = \frac{1}{2} \times \frac{4}{5} =$ ■

3. $\frac{1}{3}$ of $\frac{3}{5}$

4. $\frac{2}{3}$ of $\frac{3}{5}$

5. $\frac{3}{3}$ of $\frac{3}{5}$

6. $\frac{4}{3}$ of $\frac{3}{5}$

7. $\frac{1}{4} \times \frac{5}{6}$

8. $\frac{2}{4} \times \frac{5}{6}$

9. $\frac{3}{4} \times \frac{5}{6}$

10. $\frac{4}{4} \times \frac{5}{6}$

11. $\frac{1}{2} \times \frac{3}{4}$

12. $\frac{2}{2} \times \frac{3}{4}$

13. $\frac{3}{2} \times \frac{3}{4}$

14. $\frac{4}{2} \times \frac{3}{4}$

15. $\frac{1}{5} \times \frac{5}{7}$

16. $\frac{2}{5} \times \frac{5}{7}$

17. $\frac{3}{5} \times \frac{5}{7}$

18. $\frac{4}{5} \times \frac{5}{7}$

19. $\frac{1}{6} \times \frac{4}{8}$

20. $\frac{6}{3} \times \frac{1}{9}$

21. $\frac{5}{4} \times \frac{4}{3}$

22. $\frac{1}{12} \times \frac{18}{4}$

PRACTICE

Multiply. Write the answer in simplest terms.

1. $\frac{1}{2} \times \frac{1}{3}$ **2.** $\frac{2}{5} \times \frac{1}{4}$ **3.** $\frac{3}{8} \times \frac{5}{6}$ **4.** $\frac{2}{7} \times \frac{3}{11}$

5. $\frac{3}{7} \times \frac{3}{9}$ **6.** $\frac{7}{8} \times \frac{1}{9}$ **7.** $\frac{5}{9} \times \frac{9}{10}$ **8.** $\frac{1}{6} \times \frac{3}{4}$

9. $\frac{2}{3} \times \frac{4}{9}$ **10.** $\frac{8}{8} \times \frac{10}{11}$ **11.** $\frac{3}{8} \times \frac{6}{9}$ **12.** $\frac{5}{12} \times \frac{10}{10}$

13. $\frac{6}{6} \times \frac{5}{9}$ **14.** $\frac{3}{4} \times \frac{5}{5}$ **15.** $\frac{1}{2} \times \frac{4}{3}$ **16.** $\frac{3}{2} \times \frac{5}{8}$

17. $\frac{3}{8} \times \frac{6}{5}$ **18.** $\frac{6}{7} \times \frac{3}{4}$ **19.** $\frac{5}{4} \times \frac{8}{15}$ **20.** $\frac{10}{7} \times \frac{5}{7}$

What part of an hour is:

21. $\frac{1}{2}$ of $\frac{1}{2}$ hour? **22.** $\frac{1}{3}$ of $\frac{1}{2}$ hour? **23.** $\frac{3}{4}$ of $\frac{1}{3}$ hour?

24. $\frac{5}{8}$ of $\frac{2}{3}$ hour? **25.** $\frac{5}{6}$ of 9 hours? **26.** $\frac{1}{9}$ of $\frac{3}{4}$ hour?

27. How many minutes are there in each of Questions 21 to 26?

Telephone Rates

The telephone company gives discounts for calls made outside of "peak" hours.

What are the peak hours?

Calculate the total phone bill.

Monday to Friday	08:00 to 18:00	No discount
Monday to Friday	18:00 to 23:00	$\frac{1}{3}$ Off
Saturday	08:00 to 12:00	No Discount
Saturday	12:00 to 23:00	$\frac{2}{3}$ Off
Sunday	08:00 to 18:00	$\frac{2}{3}$ Off
Sunday	18:00 to 23:00	$\frac{1}{2}$ Off
Daily	23:00 to 08:00	$\frac{2}{3}$ Off

Call	Day	Time	Regular Charge	Discount	Net Charge
Lethbridge	Sunday	19:00	$16.00		
Winnipeg	Wednesday	18:30	$21.00		
Moncton	Saturday	11:30	$ 4.80		
Sherbrooke	Friday	07:45	$27.00		
				Total	

Multiplying With Mixed Numerals

Fractions are often used to describe stock market values in dollars.

What is the cost of 9 shares of stock if one share is listed at $3\frac{3}{4}$?

$$9 \times \boxed{3\frac{3}{4}} = 9 \times \boxed{\frac{15}{4}} = \frac{9 \times 15}{4} = \frac{135}{4} = 33\frac{3}{4}$$

The stock costs $33\frac{3}{4}$ dollars or \$33.75.

On May 1, one share of a stock was listed at $3\frac{3}{8}$.

By July 31, the value of one share dropped to $\frac{2}{3}$ of this amount. What is the new value?

$$\frac{2}{3} \times \boxed{3\frac{3}{8}} = \frac{2}{3} \times \boxed{\frac{27}{8}} = \frac{2 \times 27}{3 \times 8} = \frac{54}{24} = 2\frac{6}{24} = 2\frac{1}{4}$$

The new value is $2\frac{1}{4}$.

EXERCISES

Multiply. Write the answer in simplest terms.

1. $7 \times \boxed{5\frac{1}{2}} = 7 \times \boxed{\frac{11}{2}} = \blacksquare$

2. $\boxed{3\frac{2}{5}} \times 2 = \boxed{\frac{17}{5}} \times 2 = \blacksquare$

3. $\frac{2}{3} \times \boxed{1\frac{1}{4}} = \frac{2}{3} \times \boxed{\frac{5}{4}} = \blacksquare$

4. $\boxed{1\frac{3}{8}} \times \frac{3}{4} = \boxed{\frac{11}{8}} \times \frac{3}{4} = \blacksquare$

5. $3 \times 1\frac{1}{2}$

6. $2 \times 1\frac{1}{2}$

7. $\frac{2}{2} \times 1\frac{1}{2}$

8. $\frac{1}{2} \times 1\frac{1}{2}$

9. $3 \times 1\frac{1}{3}$

10. $2 \times 1\frac{1}{3}$

11. $\frac{2}{2} \times 1\frac{1}{3}$

12. $\frac{1}{2} \times 1\frac{1}{3}$

13. $4 \times 2\frac{3}{4}$

14. $2 \times 2\frac{3}{4}$

15. $\frac{2}{2} \times 2\frac{3}{4}$

16. $\frac{1}{4} \times 2\frac{3}{4}$

17. $8 \times 2\frac{2}{9}$

18. $4 \times 2\frac{2}{9}$

19. $\frac{4}{4} \times 2\frac{2}{9}$

20. $\frac{1}{4} \times 2\frac{2}{9}$

21. $2\frac{2}{3} \times 6$

22. $10 \times 4\frac{1}{2}$

23. $9\frac{1}{3} \times \frac{1}{2}$

24. $\frac{5}{6} \times 3\frac{4}{5}$

25. $\frac{5}{6} \times 3\frac{1}{3}$

26. $\frac{7}{12} \times 4$

27. $4\frac{5}{7} \times \frac{2}{3}$

28. $\frac{4}{9} \times 6\frac{1}{3}$

PRACTICE

Multiply. Write the answer in simplest terms.

1. $\frac{1}{2} \times 9\frac{1}{2}$
2. $3\frac{1}{7} \times 3$
3. $\frac{3}{3} \times 5\frac{5}{6}$
4. $\frac{2}{3} \times 1\frac{1}{2}$
5. $3 \times 5\frac{3}{5}$
6. $3\frac{1}{4} \times 4$
7. $6\frac{2}{3} \times \frac{1}{4}$
8. $\frac{3}{8} \times 2\frac{1}{4}$
9. $4\frac{5}{8} \times 2$
10. $6 \times 7\frac{1}{5}$
11. $\frac{1}{3} \times 4\frac{6}{7}$
12. $3\frac{2}{3} \times \frac{1}{4}$
13. $6\frac{2}{3} \times \frac{3}{4}$
14. $7\frac{5}{8} \times 4$
15. $\frac{5}{9} \times 3\frac{1}{5}$
16. $\frac{8}{11} \times 2\frac{1}{2}$
17. $18 \times 1\frac{1}{3}$
18. $\frac{3}{7} \times 2\frac{1}{10}$
19. $2\frac{1}{11} \times 10$
20. $\frac{7}{8} \times 5\frac{1}{3}$

21. Copy and complete the chart.

Value of One Share of Stock	Value of 4 Shares	Value of 8 Shares	Value of 15 Shares	Value of 50 Shares
$2\frac{1}{2}$				
$6\frac{1}{4}$				
$7\frac{1}{8}$				
$2\frac{3}{8}$				

More Mixed Numerals

To do multiplication involving two mixed numerals, change both to the form of fractions.

$$2\frac{1}{2} \times 3\frac{1}{2} = \frac{5}{2} \times \frac{7}{2} = \frac{35}{4} = 8\frac{3}{4}$$

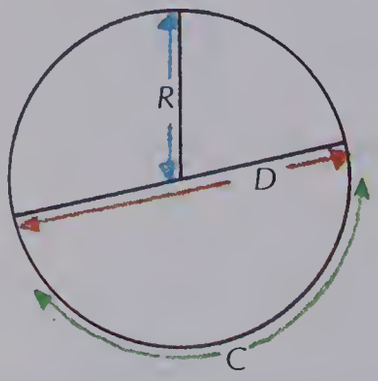
Multiply. Write the answer in simplest terms.

1. $3\frac{2}{3} \times 1\frac{1}{2}$
2. $2\frac{1}{5} \times 1\frac{1}{3}$
3. $1\frac{1}{3} \times 2\frac{1}{4}$
4. $3\frac{3}{4} \times 1\frac{1}{2}$
5. $1\frac{3}{5} \times 3\frac{1}{2}$
6. $2\frac{3}{4} \times 1\frac{1}{6}$
7. $2\frac{1}{3} \times 1\frac{4}{5}$
8. $3\frac{1}{8} \times 2\frac{4}{5}$
9. $1\frac{3}{10} \times 2\frac{1}{2}$
10. $2\frac{2}{5} \times 1\frac{3}{8}$
11. $1\frac{1}{3} \times 2\frac{1}{4}$
12. $1\frac{5}{9} \times 2\frac{1}{7}$

Formulas

A special number called **pi** was discussed on page 106.
Pi is often approximated by a fraction.
Pi is about $\frac{22}{7}$.

Pi is used in calculations involving circles.



C = Circumference
R = Radius
D = Diameter
A = Area

Using letters for measurements of parts of a circle, we can write **formulas** for area and circumference.

$$A = \textbf{pi} \times R^2$$

$$C = \textbf{pi} \times D$$

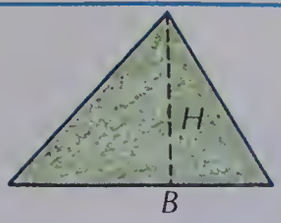
EXERCISES

1. What is the circumference of a circle with a diameter of 7 cm?
2. What is the area of a circle with a radius of 7 cm?
3. What is the circumference of a circle with a radius of 3.5 cm?
4. What is the area of a circle with a diameter of 14 cm?
5. Write a formula that shows the radius **in terms of** the diameter.
6. Write a formula that shows the diameter **in terms of** the radius.

PRACTICE

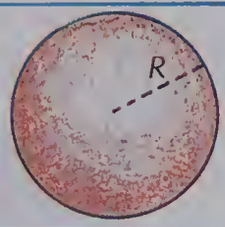
Area of a Triangle

$A = \frac{1}{2} \times B \times H$



Volume of a Sphere

$V = \frac{4}{3} \times \textbf{pi} \times R^3$



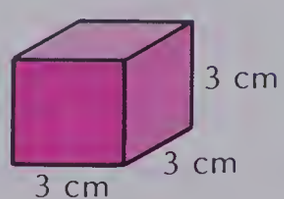
Solve these problems using the formulas above.

1. What is the area of a triangle with a base of 4 cm and a height of 3 cm?

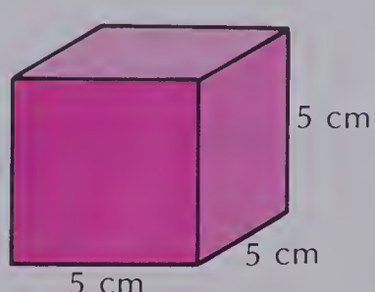
2. What is the volume of a sphere with a **radius** of 1 cm?

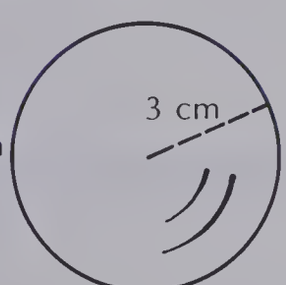
3. What is the area of a triangle with a base of 5 cm and a height of 4 cm?

4. Which has a greater volume, the box or the sphere?



5. Which has a greater volume, the box or the sphere?





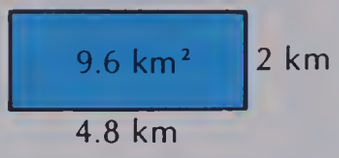
REVIEW

Multiply. Write the answer in simplest terms.

A39	1. $\frac{1}{5} \times 8$	2. $\frac{11}{12} \times 8$	3. $\frac{5}{7} \times 6$	4. $40 \times \frac{5}{6}$
A40	5. $\frac{1}{2} \times \frac{6}{7}$	6. $\frac{3}{5} \times \frac{8}{9}$	7. $\frac{2}{3} \times \frac{5}{7}$	8. $\frac{9}{10} \times \frac{4}{5}$
A41	9. $18 \times 1\frac{1}{3}$	10. $6\frac{1}{4} \times 10$	11. $\frac{2}{3} \times 5\frac{1}{2}$	12. $3\frac{3}{7} \times \frac{1}{2}$

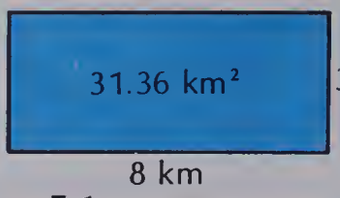
Multiplying Decimals

Find the area of each rectangular lot.



$$\begin{array}{r} 4.8 \\ \times\ 2 \\ \hline 9.6 \end{array}$$

4.8 } 1 decimal place
2 } 0 decimal places
9.6 } 1 decimal place



$$\begin{array}{r} {\scriptstyle 7\ 1} \\ 3.92 \\ \times\ 8 \\ \hline 31.36 \end{array}$$

3.92 } 2 decimal places
8 } 0 decimal places
31.36 } 2 decimal places

$$\begin{array}{r} {\scriptstyle 1\ 3} \\ 1.015 \\ \times\ 7 \\ \hline 7.105 \end{array}$$

1.015 } 3 decimal places
7 } 0 decimal places
7.105 } 3 decimal places

Always estimate to check whether a product is reasonable.

$$\begin{array}{r} 5 \\ \times 2 \\ \hline 10 \end{array} \qquad \begin{array}{r} 4 \\ \times 8 \\ \hline 32 \end{array} \qquad \begin{array}{r} 1 \\ \times 7 \\ \hline 7 \end{array}$$

EXERCISES

How many decimal places will be in each answer? Multiply.

1. $\begin{array}{r} 32 \\ \times\ 4 \\ \hline \end{array}$	**2.** $\begin{array}{r} 3.2 \\ \times\ 4 \\ \hline \end{array}$	**3.** $\begin{array}{r} 3.02 \\ \times\ 4 \\ \hline \end{array}$	**4.** $\begin{array}{r} 3.002 \\ \times\ 4 \\ \hline \end{array}$	**5.** $\begin{array}{r} 3.222 \\ \times\ 4 \\ \hline \end{array}$
6. $\begin{array}{r} 63 \\ \times\ 3 \\ \hline \end{array}$	**7.** $\begin{array}{r} 6.3 \\ \times\ 3 \\ \hline \end{array}$	**8.** $\begin{array}{r} 6.03 \\ \times\ 3 \\ \hline \end{array}$	**9.** $\begin{array}{r} 6.003 \\ \times\ 3 \\ \hline \end{array}$	**10.** $\begin{array}{r} 6.333 \\ \times\ 3 \\ \hline \end{array}$
11. $\begin{array}{r} 57 \\ \times\ 9 \\ \hline \end{array}$	**12.** $\begin{array}{r} 5.7 \\ \times\ 9 \\ \hline \end{array}$	**13.** $\begin{array}{r} 5.07 \\ \times\ 9 \\ \hline \end{array}$	**14.** $\begin{array}{r} 5.007 \\ \times\ 9 \\ \hline \end{array}$	**15.** $\begin{array}{r} 5.777 \\ \times\ 9 \\ \hline \end{array}$

Estimate the answer, then multiply.

16. $\begin{array}{r} 7.8 \\ \times\ 7 \\ \hline \end{array}$	**17.** $\begin{array}{r} 8.13 \\ \times\ 9 \\ \hline \end{array}$	**18.** $\begin{array}{r} 6.002 \\ \times\ 4 \\ \hline \end{array}$	**19.** $\begin{array}{r} 4.217 \\ \times\ 48 \\ \hline \end{array}$	**20.** $\begin{array}{r} 8.04 \\ \times\ 19 \\ \hline \end{array}$
21. $\begin{array}{r} 4.23 \\ \times\ 14 \\ \hline \end{array}$	**22.** $\begin{array}{r} 8.014 \\ \times\ 27 \\ \hline \end{array}$	**23.** $\begin{array}{r} 5.44 \\ \times\ 35 \\ \hline \end{array}$	**24.** $\begin{array}{r} 6.72 \\ \times\ 17 \\ \hline \end{array}$	**25.** $\begin{array}{r} 9.32 \\ \times\ 47 \\ \hline \end{array}$

PRACTICE

Find the product.

1. 5.8×6	**2.** 3.45×7	**3.** 6.003×4	**4.** 9.02×8	**5.** 4.3×7
6. 7.559×8	**7.** 2.07×6	**8.** 3.017×9	**9.** 7.6×5	**10.** 4.86×7
11. 3.7×61	**12.** 5.03×22	**13.** 7.006×38	**14.** 1.41×15	**15.** 6.012×14
16. 9.71×85	**17.** 6.075×74	**18.** 4.215×501	**19.** 9.008×243	**20.** 3.172×132

The length and width of each rectangle are given. Calculate the area. Estimate to check whether each answer is reasonable.

21. length = 17.2 m
width = 8 m

22. length = 12 m
width = 6.08 m

23. length = 5.064 km
width = 13 km

24. length = 72 km
width = 74.25 km

Areas and Perimeters

Compare the areas and perimeters of rectangles **A**, **B**, and **C**.
Replace each ■ with $<$, $=$, or $>$.

A.

B.

C.

1. Area of **A** ■ Area of **B** ■ Area of **C**
2. Perimeter of **A** ■ Perimeter of **B** ■ Perimeter of **C**

Multiplying Decimals

An Ontario mine produces about 0.9 t (tonnes) of silver every week. Five years ago, they produced only half (0.5) as much. About how much silver did they mine five years ago?

$0.5 \times 0.9 = \blacksquare$

$\frac{5}{10} \times \frac{9}{10} = \frac{45}{100}$

$$\begin{array}{r} 0.9 \\ \times 0.5 \\ \hline ? \end{array} \qquad \begin{array}{r} 9 \\ \times 5 \\ \hline 45 \end{array}$$

$$\begin{array}{r} 0.9 \\ \times 0.5 \\ \hline 0.45 \end{array} \quad \begin{array}{l} \} \text{ 1 decimal place} \\ \} \text{ 1 decimal place} \\ \} \text{ 2 decimal places} \end{array}$$

Five years ago, the mine produced about 0.45 t of silver every week.

tenths × tenths ⟶ hundredths

EXERCISES

Multiply.

1. $\frac{1}{10} \times \frac{2}{10}$ **2.** $\frac{3}{10} \times \frac{8}{10}$ **3.** $\frac{2}{10} \times \frac{4}{10}$ **4.** $\frac{7}{10} \times \frac{9}{10}$

5. $\begin{array}{r} 0.2 \\ \times 0.1 \\ \hline \end{array}$ **6.** $\begin{array}{r} 0.8 \\ \times 0.3 \\ \hline \end{array}$ **7.** $\begin{array}{r} 0.4 \\ \times 0.2 \\ \hline \end{array}$ **8.** $\begin{array}{r} 0.9 \\ \times 0.7 \\ \hline \end{array}$

9. $\frac{1}{10} \times \frac{8}{10}$ **10.** $\frac{7}{10} \times \frac{3}{10}$ **11.** $\frac{1}{10} \times \frac{1}{10}$ **12.** $\frac{4}{10} \times \frac{4}{10}$

13. $\begin{array}{r} 0.8 \\ \times 0.1 \\ \hline \end{array}$ **14.** $\begin{array}{r} 0.3 \\ \times 0.7 \\ \hline \end{array}$ **15.** $\begin{array}{r} 0.1 \\ \times 0.1 \\ \hline \end{array}$ **16.** $\begin{array}{r} 0.4 \\ \times 0.4 \\ \hline \end{array}$

17. $\begin{array}{r} 0.9 \\ \times 0.9 \\ \hline \end{array}$ **18.** $\begin{array}{r} 0.7 \\ \times 0.8 \\ \hline \end{array}$ **19.** $\begin{array}{r} 0.6 \\ \times 0.1 \\ \hline \end{array}$ **20.** $\begin{array}{r} 0.3 \\ \times 0.3 \\ \hline \end{array}$

PRACTICE

Find the product.

1. 0.6×0.3	**2.** 0.7×0.7	**3.** 0.2×0.3	**4.** 0.9×0.3	**5.** 0.8×0.6
6. 0.4×7	**7.** 0.5×0.4	**8.** 0.3×0.3	**9.** 0.7×0.1	**10.** 0.3×1
11. 0.8×0.4	**12.** 0.1×9	**13.** 0.5×0.3	**14.** 0.8×8	**15.** 0.9×0.2

Copy and complete. Use $<$, $=$, or $>$.

16. $0.2 + 0.2 \blacksquare 0.2 \times 0.2$

17. $0.5 + 0.7 \blacksquare 3 \times 0.4$

18. $15 - 14.3 \blacksquare 10 \times 0.7$

19. $0.1 \times 0.1 \blacksquare 1 - 0.99$

20. $2.5 - 0.7 \blacksquare 0.6 \times 3$

21. $0.5 \times 0.9 \blacksquare 0.02 + 0.4$

22. Copy and complete.

×	0.8	0.9	0.7	0.1	9	36
100						
10						
1						
0.1						

23. Newfoundland produces about half (0.5) of Canada's iron ore. Quebec produces about 0.6 as much as Newfoundland. What part of Canada's total does Quebec produce?

Combinations

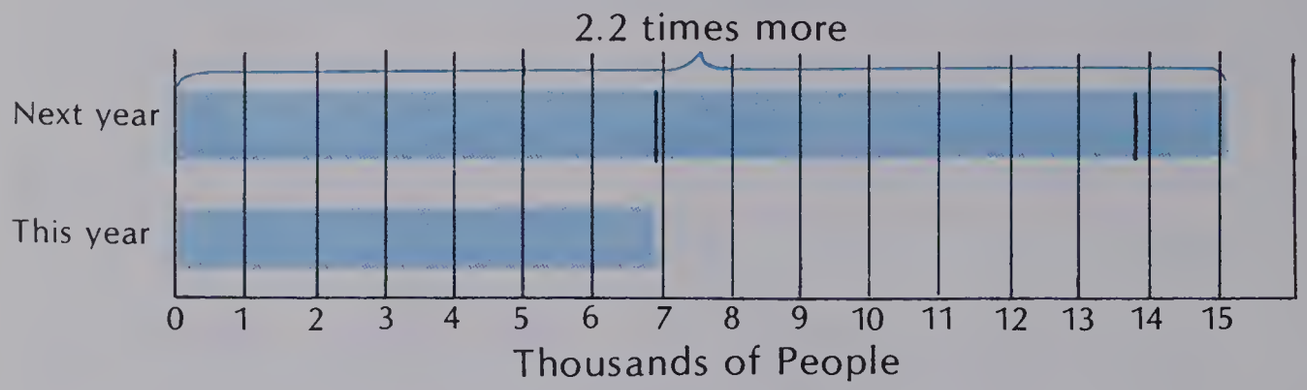
1. Use six 9s to write an expression for 100.
2. Use five 5s to write an expression for 100.
3. Use eight 7s to write an expression for 100.

Here is one solution:

$9 \times 9 + 9 + 9 + \frac{9}{9} = 100.$

Multiplying Decimals

This year 6.9 thousand people attended a math convention in Winnipeg. Next year, the organizers expect 2.2 times as many people in Toronto. How many people do they expect to come next year?



$$\begin{array}{r} 6.9 \\ \times\ 2.2 \\ \hline 138 \\ 138 \\ \hline 15.18 \end{array} \quad \begin{array}{l} \left.\begin{array}{l} \\ \end{array}\right\} \text{1 decimal place} \\ \left.\begin{array}{l} \\ \end{array}\right\} \text{1 decimal place} \\ \\ \\ \left.\begin{array}{l} \\ \end{array}\right\} \text{2 decimal places} \end{array}$$

or

$$\frac{69}{10} \times \frac{22}{10} = \frac{1518}{100} = 15.18$$

Check by estimating:

$7 \times 2 = 14$

They expect about 15 thousand people next year.

EXERCISES

Multiply.

1. $\frac{6}{10} \times 3\frac{2}{10}$ **2.** $\frac{3}{10} \times 4\frac{1}{10}$ **3.** $1\frac{5}{10} \times 2\frac{1}{10}$ **4.** $8\frac{2}{10} \times 2\frac{3}{10}$

5. $\begin{array}{r} 3.2 \\ \times 0.6 \\ \hline \end{array}$ **6.** $\begin{array}{r} 4.1 \\ \times 0.3 \\ \hline \end{array}$ **7.** $\begin{array}{r} 2.1 \\ \times 1.5 \\ \hline \end{array}$ **8.** $\begin{array}{r} 2.3 \\ \times 8.2 \\ \hline \end{array}$

9. $\begin{array}{r} 4.3 \\ \times 0.5 \\ \hline \end{array}$ **10.** $\begin{array}{r} 4.3 \\ \times\ 1 \\ \hline \end{array}$ **11.** $\begin{array}{r} 4.3 \\ \times 1.5 \\ \hline \end{array}$ **12.** $\begin{array}{r} 4.3 \\ \times\ 2 \\ \hline \end{array}$

Multiply. Check by estimating.

13. $\begin{array}{r} 5.3 \\ \times 0.4 \\ \hline \end{array}$ **14.** $\begin{array}{r} 5.3 \\ \times 2.4 \\ \hline \end{array}$ **15.** $\begin{array}{r} 6.7 \\ \times 0.8 \\ \hline \end{array}$ **16.** $\begin{array}{r} 6.7 \\ \times 3.8 \\ \hline \end{array}$

PRACTICE

Find the product.

1. 3.2×0.2	**2.** 5.8×7	**3.** 6.8×9.3	**4.** 4.5×0.6	**5.** 3.9×12
6. 8.1×7	**7.** 6.7×5.5	**8.** 5.9×17	**9.** 1.4×8.2	**10.** 7.2×0.5
11. 7.8×3.7	**12.** 8.8×0.2	**13.** 6.9×6.9	**14.** 5.3×72	**15.** 3.9×4.1

Solve.

16. Maria can run 1 km in 6.7 min. If she keeps the same pace, how long will it take her to run 2.5 km?

17. Mr. Dalos put $12 000 in a bank savings account ten years ago. Today he has 2.3 times that amount because of the interest the money earned. How much money does he have now?

Copy and complete.

18.

In	Out
N	$N \times 3.4$
5.2	
0.4	
6.7	

19.

In	Out
N	$(N - 0.6) \times 7.5$
1.9	
3.7	
5.8	

20.

In	Out
N	$(N + 0.2) \times 1.2$
0.3	
5.6	
2.9	

Letter Logic

Each letter stands for a different digit.
Find their values and check by multiplying.

$$\begin{array}{r} A.B \\ \times A.B \\ \hline BC \\ AB \\ \hline A.DC \end{array}$$

Multiplying Decimals

When a house is sold, 0.05 of the selling price for the house goes to the real estate company. Half of the real estate company's money goes to the agent who sold the house. What part of the money paid for the house does the real estate agent receive?

Half of 0.05

$0.5 \times 0.05 = \blacksquare$

0.5	1 decimal place
$\times$ 0.05	2 decimal places
0.025	3 decimal places

or

$$\frac{5 \times 5}{10 \times 100} = \frac{25}{1000}$$

The agent receives 0.025 of the money paid.

tenths $\times$ hundredths $\longrightarrow$ thousandths

EXERCISES

Multiply.

1. $\frac{6}{10} \times \frac{2}{100}$
2. $\frac{2}{10} \times \frac{3}{100}$
3. $\frac{5}{10} \times \frac{9}{100}$
4. $\frac{3}{10} \times \frac{3}{100}$

5. 0.02×0.6
6. 0.03×0.2
7. 0.09×0.5
8. 0.03×0.3

9. $\frac{3}{10} \times \frac{8}{100}$
10. $\frac{7}{10} \times \frac{15}{100}$
11. $\frac{6}{10} \times \frac{32}{100}$
12. $\frac{5}{10} \times \frac{78}{100}$

13. 0.08×0.3
14. 0.15×0.7
15. 0.32×0.6
16. 0.78×0.5

17. 0.55×0.6
18. 0.74×0.8
19. 0.91×0.4
20. 0.37×0.9

PRACTICE

Find the product.

1. 0.14×0.2	**2.** 0.06×0.1	**3.** 0.57×9	**4.** 0.48×0.2	**5.** 0.62×0.5
6. 0.04×0.2	**7.** 0.05×0.8	**8.** 0.98×0.2	**9.** 0.09×0.1	**10.** 0.47×6
11. 0.38×16	**12.** 0.02×0.1	**13.** 0.83×7	**14.** 0.31×0.6	**15.** 0.29×48

Copy and compare. Use $<$, $=$, or $>$.

16. $0.2 \times 0.2 \blacksquare 0.95 - 0.91$

17. $0.01 \times 0.7 \blacksquare 0.5 + 0.2$

18. $15.1 - 15.09 \blacksquare 0.1 \times 0.1$

19. $0.5 \times 0.32 \blacksquare 0.25 - 0.09$

20. $3.2 - 3.09 \blacksquare 0.5 \times 0.02$

21. $0.9 \times 0.02 \blacksquare 0.09 + 0.09$

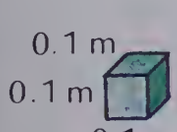
22. Copy and complete.

×	10	0.5	0.8	900	842	10.3	40.7
10							
1							
0.1							
0.01							

Three Factors

Find the volume of each box.

a.

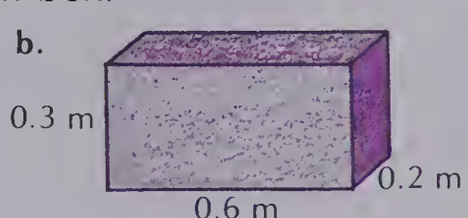


$\frac{1}{10} \times \frac{1}{10} \times \frac{1}{10} = \blacksquare$

Or, $0.1 \times 0.1 \times 0.1 = \blacksquare$

Volume = ■ m^3

b.

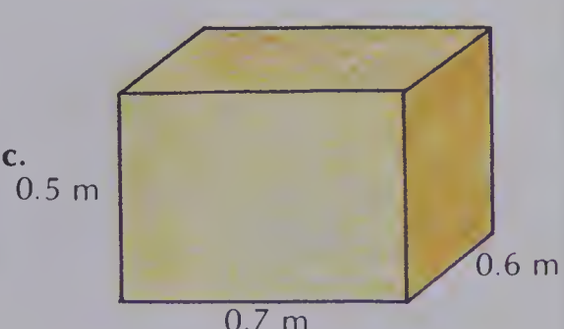


$\frac{6}{10} \times \frac{3}{10} \times \frac{2}{10} = \blacksquare$

Or, $0.6 \times 0.3 \times 0.2 = \blacksquare$

Volume = ■ m^3

c.



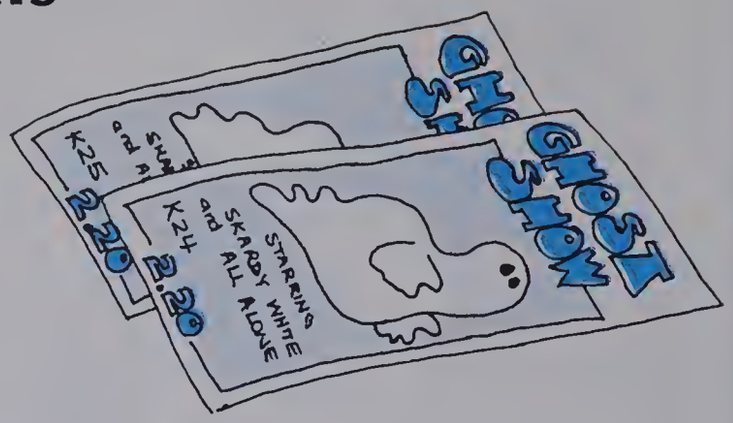
$\frac{5}{10} \times \frac{6}{10} \times \frac{7}{10} = \blacksquare$

Or, $0.5 \times 0.6 \times 0.7 = \blacksquare$

Volume = ■ m^3

Multiplying Decimals

Tickets at a theatre cost $2.20 each. Production costs have gone up by 1.7 times. The manager has decided to raise ticket prices at the same rate. What will the new ticket price be?



$1.7 \times \$2.20 = \blacksquare$

$$\begin{array}{r} {\scriptstyle 1} \\ 2.20 \\ \times\ 1.7 \\ \hline 1540 \\ 220 \\ \hline 3.740 \end{array}$$

2 decimal places
1 decimal place
3 decimal places

or

$$\frac{17}{10} \times \frac{220}{100} = \frac{3740}{1000} = 3.740$$

Check by estimating:

$2 \times \$2 = \$4$

The new price will be $3.74.

EXERCISES

Multiply.

1. $\frac{5}{10} \times 2\frac{1}{100}$ **2.** $\frac{3}{10} \times 2\frac{2}{100}$ **3.** $1\frac{4}{10} \times 1\frac{3}{100}$ **4.** $2\frac{2}{10} \times 3\frac{1}{100}$

5. 2.01×0.5 **6.** 2.02×0.3 **7.** 1.03×1.4 **8.** 3.01×2.2

9. 3.48×0.5 **10.** 3.48×1.5 **11.** 3.48×2.5 **12.** 3.48×3.5

Estimate the answer, then multiply.

13. 4.07×5.8 **14.** 3.89×6.1 **15.** 9.91×1.7 **16.** 6.03×4.2

17. $\$6.54 \times 7.2$ **18.** $\$8.49 \times 6.5$ **19.** $\$4.88 \times 5.6$ **20.** $\$7.61 \times 8.4$

PRACTICE

Find the product.

1. 5.77×0.4	**2.** 4.69×1.2	**3.** 26.8×0.14	**4.** 3.58×2.5	**5.** 6.85×3.2
6. 65.6×35	**7.** 4.25×3.3	**8.** 875×6.12	**9.** 1.51×0.2	**10.** 15.9×2.13
11. 895×1.2	**12.** 63.8×4.09	**13.** 4.77×22	**14.** 3.98×4.3	**15.** 422×1.08

Simplify.

16. $1.2 + 4.3 \times 0.5$
17. $95 - 6.1 \times 5.1$
18. $5.21 \times (4.1 + 2.6)$
19. $42.3 \times (7.5 - 1.04)$
20. $200 - 3.1 \times 0.1$
21. $8.8 + 7.2 \times 0.02$

Copy and complete.

22.

In	Out
N	$N \times 1.01$
3.5	
8	
46	

23.

In	Out
N	$(N + 1.2) \times 6.25$
3	
12	
50	

24.

In	Out
N	$(N - 6.25) \times 1.2$
14	
25	
80	

USING THE CALCULATOR

1. **a.** Enter: [•] [5] [×] [•] [5] [=]
b. Enter: [•] [5] [×] [=]
What is the answer in both cases?

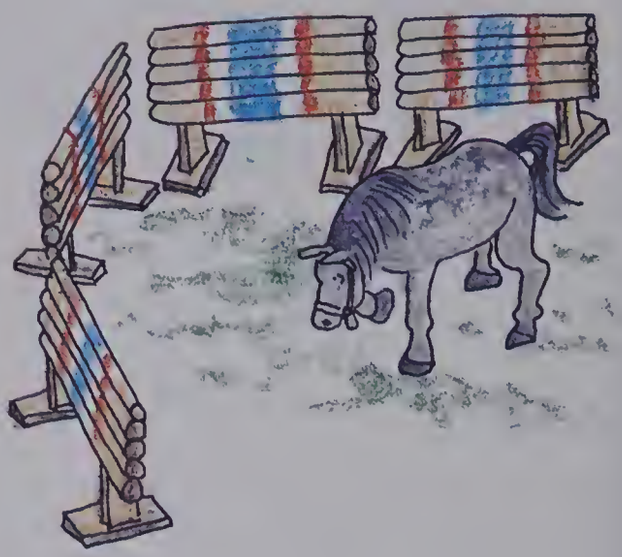
2. Enter: [•] [5] [×]
Push [=] once. Once more. And again. What happens?

Calculate.

3. 0.5^2	**4.** 0.5^3	**5.** 0.2^2	**6.** 0.2^3
7. 0.9^2	**8.** 0.05^2	**9.** 0.09^2	**10.** 0.2^3
11. 0.1^2	**12.** 0.1^3	**13.** 0.01^3	**14.** 0.1^7

Using a Table

A horse trainer used 24 hurdles to make a temporary enclosure. She arranged them in a rectangle so that the area was as large as possible. How did she arrange them?



Make a table to solve the problem.

Perimeter	Length	Width	Area
24	11	1	11
24	10	2	20
24	9	3	27
24	8	4	32
24	7	5	35
24	6	6	36

The trainer arranged the hurdles in a square with 6 hurdles on each side.

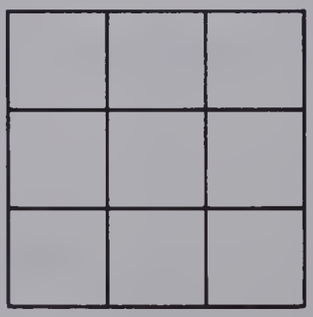
EXERCISES

1. Find the rectangular arrangement of 34 hurdles that gives the largest possible area.

2. Find the smallest perimeter of a rectangle that has an area of 48 cm^2. Each side must be an exact number of centimetres in length.

3. How many squares are there in the diagram?

4. How many rectangles are there in the diagram?



PRACTICE

1. The grades in Reading for Mrs. Wonder's class are:
A, B, B, C, A, D, C, B, A, C, C, D, B, C, C, A, D, B, C, A, C, B, B, and C. What grade was received most often?

2. The sum of the three angles of a triangle is 180°.
The sum of the four angles of a quadrilateral is 360°.
The sum of the five angles of a pentagon is 540°.
What is the sum of the eight angles of an octagon?

3. The sum of the first two odd numbers (1 + 3) is 4.
The sum of the first three odd numbers (1 + 3 + 5) is 9.
   a. Find the sum of the first four, five, and six odd numbers.
   b. Predict the sum of the first 8 odd numbers.
   c. Predict the sum of the first 10 odd numbers.

REVIEW

Multiply.

A42

1. 3.8×6	2. 4.02×3	3. 7.001×8	4. 6.023×4

A43

5. 0.1×0.1	6. 0.3×0.4	7. 0.6×0.8	8. 0.2×0.3

A44

9. 1.2×3.2	10. 6.3×5.1	11. 4.5×6.7	12. 9.8×8.9

A45

13. 0.01×0.1	14. 0.07×0.8	15. 0.02×0.3	16. 0.09×0.5

A46

17. 5.02×4.1	18. 9.85×6.4	19. 5.43×7.5	20. 7.01×9.1

TEST UNIT 8

Multiply. Write the answer in simplest terms.

1. $\frac{3}{5} \times 14$
2. $20 \times \frac{5}{6}$
3. $28 \times \frac{3}{8}$
4. $\frac{3}{4} \times 34$
5. $\frac{2}{3} \times \frac{7}{8}$
6. $\frac{5}{6} \times \frac{8}{9}$
7. $\frac{3}{8} \times \frac{6}{7}$
8. $\frac{4}{5} \times \frac{5}{6}$
9. $6 \times 3\frac{1}{4}$
10. $\frac{1}{2} \times 2\frac{2}{3}$
11. $5\frac{3}{5} \times 10$
12. $4\frac{1}{8} \times \frac{2}{3}$

Find the product.

13. $\begin{array}{r} 3.5 \\ \times\ 12 \\ \hline \end{array}$
14. $\begin{array}{r} 6.07 \\ \times\ 23 \\ \hline \end{array}$
15. $\begin{array}{r} 5.006 \\ \times\ 9 \\ \hline \end{array}$
16. $\begin{array}{r} 3.019 \\ \times\ 45 \\ \hline \end{array}$
17. $\begin{array}{r} 0.6 \\ \times 0.1 \\ \hline \end{array}$
18. $\begin{array}{r} 0.5 \\ \times 0.3 \\ \hline \end{array}$
19. $\begin{array}{r} 0.2 \\ \times 0.2 \\ \hline \end{array}$
20. $\begin{array}{r} 0.8 \\ \times 0.9 \\ \hline \end{array}$
21. $\begin{array}{r} 4.6 \\ \times 6.7 \\ \hline \end{array}$
22. $\begin{array}{r} 9.8 \\ \times 1.2 \\ \hline \end{array}$
23. $\begin{array}{r} 8.5 \\ \times 4.3 \\ \hline \end{array}$
24. $\begin{array}{r} 3.2 \\ \times 7.8 \\ \hline \end{array}$
25. $\begin{array}{r} 0.03 \\ \times\ 0.2 \\ \hline \end{array}$
26. $\begin{array}{r} 0.05 \\ \times\ 0.7 \\ \hline \end{array}$
27. $\begin{array}{r} 0.01 \\ \times\ 0.1 \\ \hline \end{array}$
28. $\begin{array}{r} 0.68 \\ \times\ 0.9 \\ \hline \end{array}$
29. $\begin{array}{r} 2.04 \\ \times\ 7.1 \\ \hline \end{array}$
30. $\begin{array}{r} 6.25 \\ \times\ 3.8 \\ \hline \end{array}$
31. $\begin{array}{r} 9.02 \\ \times\ 1.3 \\ \hline \end{array}$
32. $\begin{array}{r} 6.57 \\ \times\ 8.7 \\ \hline \end{array}$

Solve.

33. If your heart beats every 0.75 s (seconds), how long does it take to beat 100 times? 500 times? 1000 times?

34. Estimate the cost of 1.9 kg of meat priced at \$5.39/kg. Find the exact product.

ING BACK

FRACTIONS

Copy and complete.

1. $\frac{1}{2} = \frac{4}{\blacksquare}$ **2.** $\frac{3}{5} = \frac{\blacksquare}{10}$ **3.** $\frac{7}{25} = \frac{28}{\blacksquare}$ **4.** $\frac{4}{9} = \frac{\blacksquare}{81}$

Write in simplest terms.

5. $\frac{4}{6}$ **6.** $\frac{5}{10}$ **7.** $\frac{10}{15}$ **8.** $\frac{15}{100}$ **9.** $\frac{14}{28}$ **10.** $\frac{8}{10}$ **11.** $\frac{6}{14}$ **12.** $\frac{25}{100}$

Copy and complete. Write $>$, $<$, $=$.

13. $\frac{11}{20} \bullet \frac{1}{2}$ **14.** $\frac{9}{10} \bullet \frac{4}{5}$ **15.** $\frac{12}{15} \bullet \frac{4}{5}$ **16.** $\frac{19}{100} \bullet \frac{1}{5}$

17. $\frac{6}{7} \bullet \frac{19}{21}$ **18.** $\frac{3}{10} \bullet \frac{31}{100}$ **19.** $\frac{2}{3} \bullet \frac{9}{15}$ **20.** $\frac{5}{8} \bullet \frac{20}{32}$

Write as a decimal.

21. $\frac{3}{10}$ **22.** $\frac{19}{100}$ **23.** $\frac{7}{100}$ **24.** $\frac{5}{10}$

25. $\frac{1}{5}$ **26.** $\frac{1}{2}$ **27.** $\frac{3}{25}$ **28.** $\frac{3}{50}$

Multiply.

29. $\frac{1}{3} \times 15$ **30.** $\frac{1}{4} \times 28$ **31.** $\frac{1}{5} \times 65$ **32.** $\frac{1}{2} \times 36$

33. $\frac{2}{3} \times 12$ **34.** $\frac{3}{8} \times 16$ **35.** $\frac{4}{5} \times 25$ **36.** $\frac{2}{5} \times 40$

37. $\frac{3}{10} \times 10$ **38.** $\frac{7}{10} \times 30$ **39.** $\frac{7}{100} \times 400$ **40.** $\frac{19}{100} \times 200$

Solve.

41. Mary got a $\frac{1}{3}$ discount on her phone bill.
She made \$48 worth of calls.
How much did she have to pay?

UNIT 9
RATIO & PERCENT

Find Their Floor

Find each person's floor.

a. 900×0.02

b. 1.50×4

c. 3.25×4

d. 12×1.25

e. 2×1.50

f. 8×1.75

g. 0.24×50

h. 4.25×4

i. 1.25×4

j. 2.25×4

k. 8×0.25

l. 8×1.25

m. 64×0.25

n. 16×0.25

o. 2.75×4

p. 4×1.75

q. 100×0.01

r. 5×1.60

Price Rates

Marion Blue grass seed sells for four dollars **per** kilogram. What is the cost of 3 kg of grass seed?

The **rate** is

$4/kg

four dollars **per** **kilogram**

1 kg costs $4.
3 kg cost 3 × $4 = $12.

EXERCISES

Write the rate using symbols.

1. $25 **per** hour
2. $7.35 **per** kilogram
3. $1.29 **per** metre
4. $0.45 **per** litre
5. $18 **per** square metre
6. $500 **per** week

Find the cost.

7. 4 boxes at $4.50 per box
8. 6 cans at $3.95 per can
9. 18 m at 65¢/m
10. 8 L at $0.85/L
11. 100 m^2 at $25/$m^2$
12. 5 h at $2.50/h

Find the cost of one.

13. 3 kg for $9
14. 3 cans for 87¢
15. $32 for 8 h work
16. 4 for $4
17. 3 boxes for $3.30
18. 36 m^2 for $720
19. 6 cases cost $88.50
20. 8 t cost $2200

Copy and complete the table.

21.

Litres of ice cream	1	2	3	4	5
Cost in dollars	$1.95				

PRACTICE

Copy and complete the table.

1.

Number of people	1	2	3	4	5	6
Cost of movie tickets	$5.25					

Find the cost.

2. 6 kg at $5.20/kg
3. 5 cans at 35¢/can
4. 7 m at $1.99/m
5. 8 h at $6.50/h

Find the cost of one.

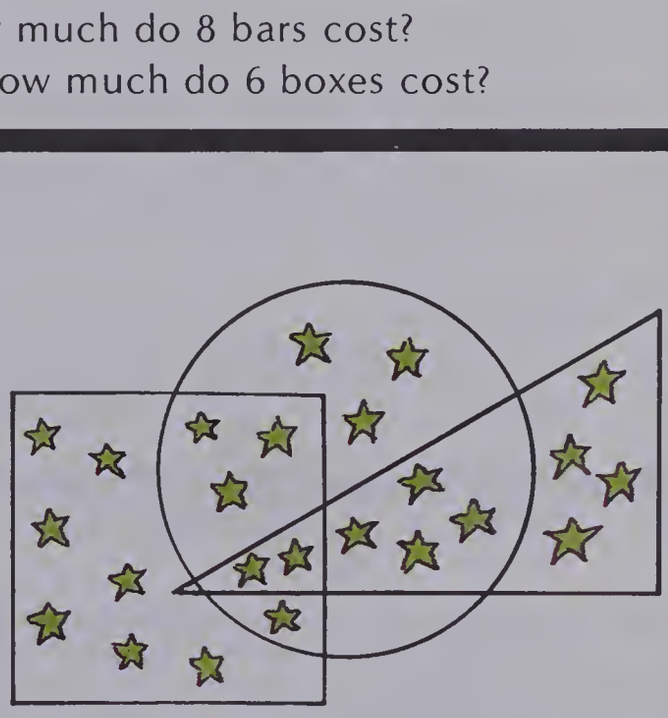
6. 8 cartons for $56.64
7. 24 L for $10.80
8. 6 m^3 for $216
9. 8 h work for $72

Solve.

10. If 6 bags of nails cost $3.60, how much does one bag cost?
11. If one card costs $0.65, how much do 6 cards cost?
12. If 3 m of carpet cost $12, how much does 1 m cost?
13. If 24 cans of beans cost $4.95, how much do 48 cans cost?
14. If 4 bars of soap cost $1.20, how much do 8 bars cost?
15. If 12 boxes of apples cost $36, how much do 6 boxes cost?

Star Gazer

1. How many stars are in ◯, but not in □ or ◺ ?
2. How many stars are in □, but not in ◯ or ◺ ?
3. How many stars are in both ◺ and ◯, but not in □ ?
4. How many stars are in ◺, ◯, and □ ?



Speed

The commuter train travels at a rate of 105 kilometres **per** hour. How far could the commuter train travel in six hours?

The **speed** is

105 km/h

kilometres per hour

In 1 h, the train travels 105 km.
In 6 h, it could travel 6 × 105 km = 630 km.

EXERCISES

Write the speed using symbols.

1. 88 kilometres **per** hour
2. 2.5 metres **per** second
3. 565 kilometres **per** day
4. 40 kilometres **per** hour

Find the distance travelled.

5. At 70 km/h, how far does a car travel in 3 h?
6. At 8 km/h, how far does a cyclist ride in 5 h?
7. At 18 m/s, how far does a train travel in 7 s?

Find the speed.

8. 450 km in 5 h (kilometres **per** hour)
9. 2000 m in 8 min (metres **per** minute)
10. 100 m in 10 s (metres **per** second)
11. 750 km in 15 h (kilometres **per** hour)

Copy and complete the table for an airplane travelling at a steady speed of 550 km/h.

12.

Time (h)	1	2	3	4	5	6
Distance (km)	550					

PRACTICE

Find the distance travelled.

1. At 75 km/h, how far could a car travel in 4 h?
2. At 330 m/s, how far does sound travel in a minute?
3. At 30 000 000 000 cm/s, how far does light travel in a minute?

Find the speed.

4. 15 m in 3 s (metres per second)
5. 2500 km in 4 h (kilometres per hour)
6. 4 km in 2 min (kilometres per minute)

Solve.

7. An Olympic swimmer swam 100 m in 50 s. What was her average speed in metres per second?

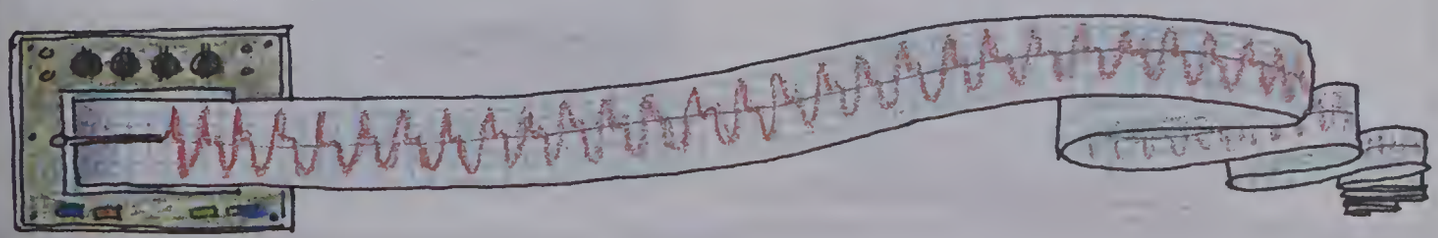
8. A long distance runner ran 10 000 m in about 25 min.
   a. What was his average speed in metres per minute?
   b. What was his average speed in metres per hour?
   c. What was his average speed in kilometres per hour?

9. Melba is making plans for a trip to Halifax. The total distance is 1830 km. Suppose she averages about 80 km/h and drives for about 8 h every day.
   How many days will the trip take?

10. A cross-country skier went 30 000 m in 1 h 30 min.
    What was his average speed in kilometres per hour?

Heart Beats

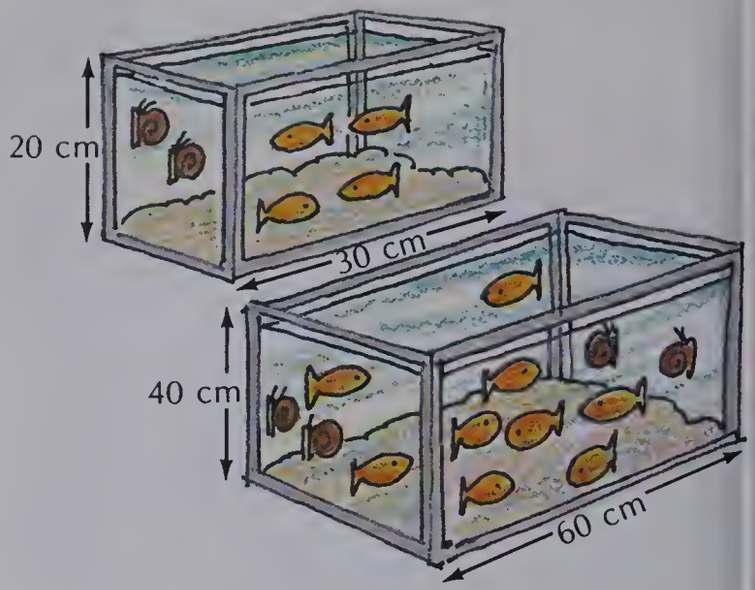
The human heart beats about 70 times per minute. How many times would it beat per year at the same rate?



Ratio

Ratio is a comparison of numbers.
The **ratio** of the number of fish in the small tank to the number of fish in the large tank is 4 to 9.

This is often written as **4:9** or $\frac{4}{9}$.



EXERCISES

Use the above picture. Write these ratios.

1. the number of snails in the large tank to the number of snails in the small tank

   4 to ■ **or** 4:■ **or** $\frac{4}{■}$

2. the height of the small tank to the height of the large tank

   ■ to 40 **or** ■:40 **or** $\frac{■}{40}$

3. the length of the small tank to the length of the large tank

   ■ to ■ **or** ■:■ **or** $\frac{■}{■}$

4. the total number of snails to the total number of fish

Write each ratio in fraction form.

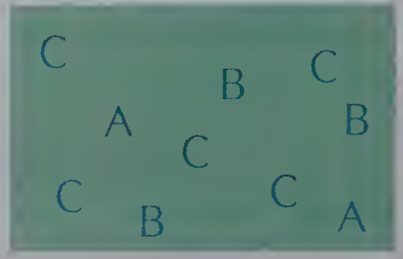
5. 2 to 1 **6.** 1 to 2 **7.** 9:5 **8.** 5:9 **9.** 8:5

Write each fraction in the ratio form (■:■).

10. $\frac{2}{3}$ **11.** $\frac{3}{2}$ **12.** $\frac{4}{1}$ **13.** $\frac{6}{5}$ **14.** $\frac{4}{7}$

Write the ratio of

15. As to Bs
16. Bs to Cs
17. As to Cs
18. As to total number of letters



PRACTICE

Write the ratio to compare the numbers of objects.

1.	M M N N M M N	Ns to Ms
2.	1 2 2 1 2 2 1 2 2 1 1	1s to 2s
3.	◇◇◇◇◇◇◇○○	◇ to ○
4.	12 books, 1 box	books to boxes
5.	8 girls, 11 boys	boys to people
6.	2 dogs, 5 cats	dogs to cats
7.	11 bananas, 15 apples	bananas to fruit
8.	6 cookies, 7 brownies	brownies to cookies

Solve.

9. There are 23 men and 27 women in a fitness club. What is the ratio of men to women?

10. A recipe calls for 2 L of ginger ale, and 5 L of fruit juice. What is the ratio of the amount of ginger ale to the amount of liquid?

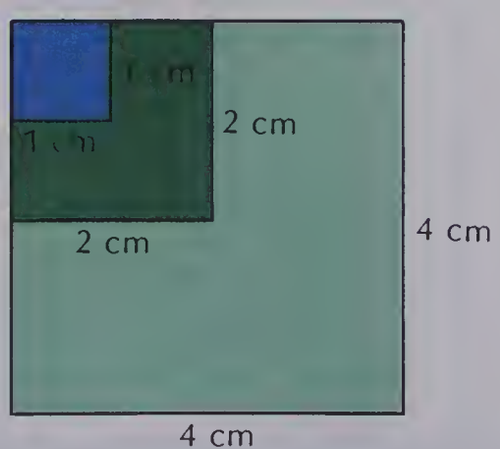
11. Marta wrote a math test with 20 questions. She got 17 correct answers. Write these ratios.
    a. correct answers to test questions
    b. wrong answers to test questions
    c. wrong answers to correct answers

Area Ratios

We can show comparisons of *three* numbers in ratio form. The ratio of the lengths of the sides of the squares is:

4:2:1 or 4 to 2 to 1.

What is the ratio of the areas of the three squares?

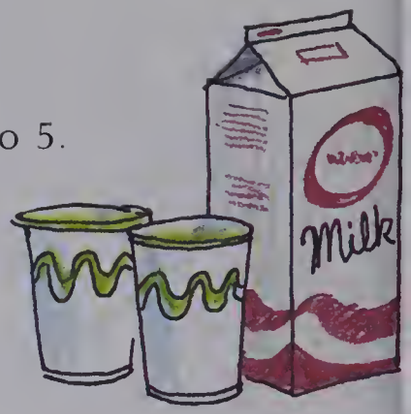


Equivalent Ratios

In planning a neighbourhood picnic, Mr. Albright decided to take 2 L of milk for every 5 children.
The ratio of litres of milk to the number of children is 2 to 5.

2 L for 5 children
4 L for 10 children
8 L for 20 children

$$\frac{2}{5} \xrightarrow{\times 2} \frac{4}{10}$$



He also planned to bring 6 beach balls for 10 children.

6 balls for 10 children
3 balls for 5 children

$$\frac{6}{10} \xrightarrow{\div 3} \frac{3}{5}$$

Two **equivalent ratios** make a **proportion**.

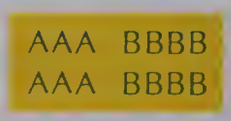
$2:5 = 4:10$ $\qquad$ $6:10 = 3:5$

$\frac{2}{5} = \frac{4}{10}$ $\qquad$ $\frac{6}{10} = \frac{3}{5}$

EXERCISES

Write a pair of ratios for each picture.

1.

2. 

3.

Find the value for N.

4. $\frac{4}{3} = \frac{8}{N}$ $\qquad$ 5. $\frac{1}{2} = \frac{N}{6}$ $\qquad$ 6. $\frac{2}{5} = \frac{N}{20}$ $\qquad$ 7. $\frac{1}{7} = \frac{3}{N}$

8. $\frac{5}{6} = \frac{10}{N}$ $\qquad$ 9. $\frac{3}{8} = \frac{N}{48}$ $\qquad$ 10. $\frac{11}{12} = \frac{N}{24}$ $\qquad$ 11. $\frac{1}{4} = \frac{5}{N}$

12. $\frac{N}{5} = \frac{10}{50}$ $\qquad$ 13. $\frac{1}{N} = \frac{2}{12}$ $\qquad$ 14. $\frac{N}{4} = \frac{12}{16}$ $\qquad$ 15. $\frac{9}{N} = \frac{27}{30}$

16. $\frac{7}{N} = \frac{21}{24}$ $\qquad$ 17. $\frac{N}{3} = \frac{8}{12}$ $\qquad$ 18. $\frac{5}{N} = \frac{15}{27}$ $\qquad$ 19. $\frac{6}{N} = \frac{1}{3}$

PRACTICE

Complete the proportion.

1. $\frac{5}{6} = \frac{15}{N}$ 2. $\frac{3}{N} = \frac{21}{28}$ 3. $\frac{1}{2} = \frac{N}{14}$ 4. $\frac{N}{8} = \frac{25}{40}$

5. $\frac{1}{N} = \frac{12}{48}$ 6. $\frac{3}{5} = \frac{18}{N}$ 7. $\frac{7}{N} = \frac{21}{27}$ 8. $\frac{2}{3} = \frac{N}{9}$

9. $\frac{N}{10} = \frac{35}{50}$ 10. $\frac{5}{N} = \frac{55}{99}$ 11. $\frac{6}{7} = \frac{30}{N}$ 12. $\frac{5}{48} = \frac{10}{N}$

Write "yes" if the ratios are equivalent and "no" if they are not.

13. 2:3, 9:12 14. 5:9, 15:18 15. 6:10, 12:20 16. 4:5, 12:20

17. 3:8, 12:32 18. 3:4, 9:20 19. 11:12, 33:36 20. 1:6, 7:48

Find the value of N.

21. $8:15 = 16:N$ 22. $8:N = 16:24$ 23. $9:35 = N:70$

24. $N:5 = 3:15$ 25. $9:5 = N:20$ 26. $3:2 = 15:N$

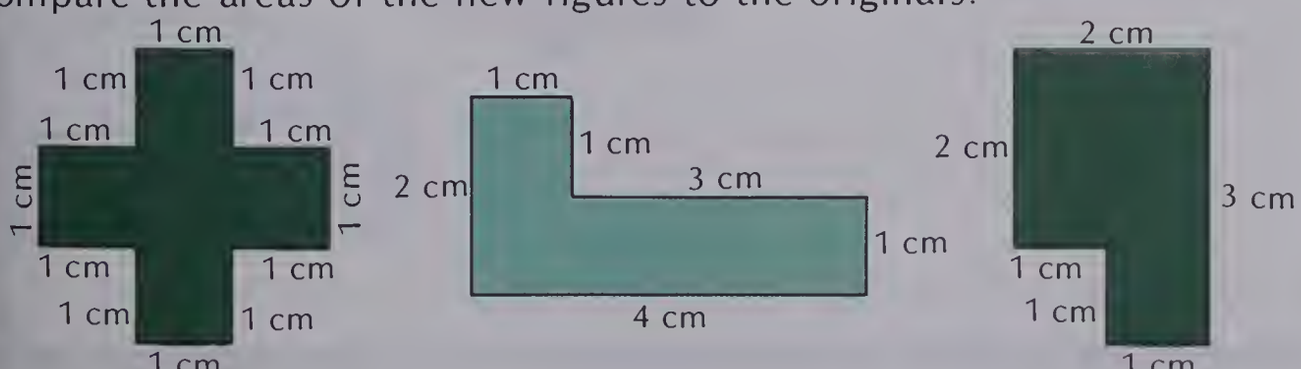
Apples are selling for 2 for 25¢.

27. How many can you buy for 50¢? 75¢? $1.00?
28. What is the cost of 12 apples?
29. What is the cost of one apple?

Proportional Drawings

Draw an enlargement of each figure using grid paper.
Make the sides 3 times longer.

Compare the areas of the new figures to the originals.

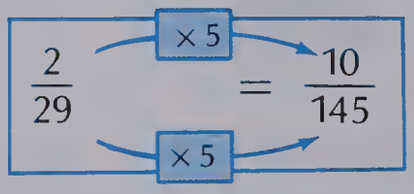


Proportion Problems

The sale price of shrubs is 2 for $29.
What will be the cost of 10 shrubs?

Write a proportion to solve the problem.
Suppose that 10 shrubs cost $N.

$$\frac{2}{29} = \frac{10}{N}$$



So, $N = 145$.
Ten shrubs cost $145.

EXERCISES

Use a proportion to find the value of N.

1. Bob bicycled 17 km in 2 h.
   At the same rate, he could travel N km in 6 h.
   $\frac{17}{2} = \frac{N}{6}$

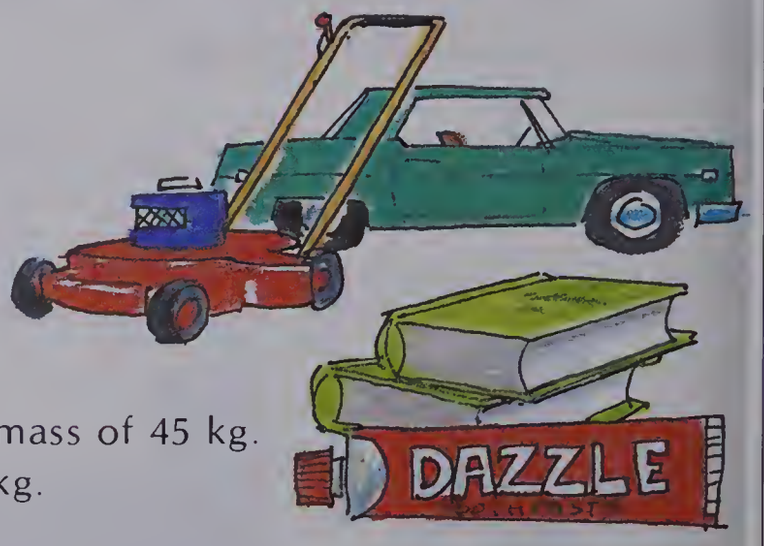
2. Four bottles of syrup cost $5.
   N bottles cost $15.
   $\frac{4}{5} = \frac{N}{15}$

3. Janet can run 50 m in 9 s.
   At the same rate, she would run 100 m in N s.
   $\frac{50}{9} = \frac{100}{N}$

Write a proportion.

4. John made $18 in 5 h.
   He could make $N in 20 h.

5. Alicia drove 230 km in 2 h.
   She could drive N km in 6 h.



6. Two cartons of books have a mass of 45 kg.
   Six cartons have a mass of N kg.

7. Three tubes of toothpaste cost $4. Nine tubes cost $N.

PRACTICE

Use proportions to solve these problems.

1. Janice earns $22 in 4 h. How much would she earn in 12 h at that rate of pay?

2. An assembly line can produce 125 radios in 3 h. How long will it take to produce 625 radios at the same rate of production?

3. 5 m of electric cable cost $2.84. What is the cost of 15 m?

4. On a map, 1 cm represents 25 km.
What is the real distance between two cities that are 5 cm apart on the map?

5. A recipe that serves 4 people requires 3 eggs. How many eggs are needed if the recipe is to serve 12 people?

REVIEW

A47

Copy and complete the table.

1.

Number of pizzas	1	2	3	4	
Cost in dollars	$5.50				$27.50

A48

Find the speed.

2. 200 m in 4 min (metres per minute)
3. 38 km in 2 h (kilometres per hour)
4. 1500 km in 2 d (kilometres per day)

N15

Write the ratio three ways.

5. 3 books for each student
6. 2 telephones for 7 people
7. 2 tea bags in each tea pot
8. 16 boys to 18 girls

N16

Find the value for N.

9. $\frac{5}{6} = \frac{N}{30}$
10. $\frac{15}{17} = \frac{30}{N}$
11. $\frac{N}{8} = \frac{12}{32}$
12. $\frac{11}{N} = \frac{33}{36}$

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Percent

In Tom's town, 32 out of every 100 people live in houses.

$\frac{32}{100}$ or 0.32 of the people live in houses.

Often this is expressed as **thirty-two percent** or **32%**.

Percent means *"per hundred"*.

1% is $\frac{1}{100}$ or 0.01.

100% is $\frac{100}{100}$ or 1.

200% is $\frac{200}{100}$ or 2.

EXERCISES

Write the fraction in decimal and percent form.

1. $\frac{6}{100}$ **2.** $\frac{7}{100}$ **3.** $\frac{50}{100}$ **4.** $\frac{38}{100}$ **5.** $\frac{75}{100}$

6. $\frac{100}{100}$ **7.** $\frac{150}{100}$ **8.** $\frac{500}{100}$ **9.** $\frac{493}{100}$ **10.** $\frac{115}{100}$

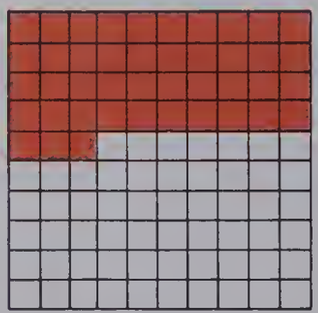
Write in percent form.

11. 0.01 **12.** 0.02 **13.** 0.05 **14.** 0.09 **15.** 0.10

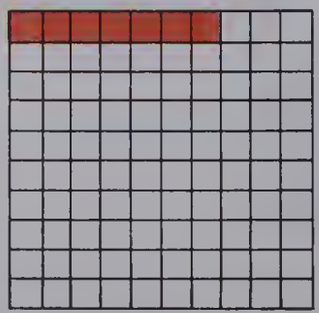
16. 0.20 **17.** 0.25 **18.** 0.59 **19.** 1.00 **20.** 1.59

Write the fraction, decimal, and the percent for the shaded part.

21.



22.



PRACTICE

What percent is:

1. 45 m of 100 m?
2. 10¢ of $1.00?
3. 95 km of 100 km?
4. 7¢ of $1.00?
5. 4 cm of 1 m?
6. $1.09 of $1.00?

Copy and complete.

7. $\frac{27}{100} = \blacksquare\%$
8. $\frac{9}{100} = \blacksquare\%$
9. $\frac{\blacksquare}{100} = 2\%$
10. $\frac{\blacksquare}{100} = 50\%$
11. $\frac{185}{100} = \blacksquare\%$
12. $\frac{\blacksquare}{100} = 225\%$
13. $0.63 = \blacksquare\%$
14. $0.85 = \blacksquare\%$
15. $0.05 = \blacksquare\%$
16. $1.35 = \blacksquare\%$
17. $0.005 = \blacksquare\%$
18. $0.125 = \blacksquare\%$

Use $<$, $=$, or $>$.

19. $26\% \bullet \frac{26}{100}$
20. $8\% \bullet \frac{80}{100}$
21. $\frac{73}{100} \bullet 37\%$
22. $100\% \bullet \frac{98}{100}$
23. $110\% \bullet 1.10$
24. $2\% \bullet 2.00$
25. $\frac{10}{100} \bullet 1\%$
26. $\frac{100}{100} \bullet 100\%$
27. $\frac{1}{100} \bullet 0.05\%$

28. The federal government collects 15% sales tax on most goods. How much do they collect from every $1.00 worth of goods sold?

29. On an assembly line, 2% of the transistors are found to be defective. How many of every 100 products are defective?

Consumer Problem

Bela gets $68 take-home pay for every $100 she earns.

1. What percent of her earnings does her employer keep for taxes and other deductions?
2. Taxes take up 25% of her pay. How much extra is deducted from every $100 of Bela's pay?

Fractions and Percents

A recent survey reported that $\frac{1}{4}$ of all households use "Zed" detergent.

$\frac{2}{5}$ of all households use "Sunshine" detergent.

Val converted these fractions into percents to compare the figures.

$$\frac{1}{4} \xrightarrow{\times 25} \frac{25}{100} = 25\%$$

$$\frac{2}{5} \xrightarrow{\times 20} \frac{40}{100} = 40\%$$

The results clearly show that "Sunshine" is more popular.

EXERCISES

Copy and complete.

1. $\frac{1}{4} = \frac{\blacksquare}{100}$ **2.** $\frac{2}{4} = \frac{\blacksquare}{100}$ **3.** $\frac{3}{4} = \frac{\blacksquare}{100}$ **4.** $\frac{4}{4} = \frac{\blacksquare}{100}$

Write the equivalent percent.

5. $\frac{1}{5}$ **6.** $\frac{2}{5}$ **7.** $\frac{3}{5}$ **8.** $\frac{4}{5}$ **9.** $\frac{5}{5}$

10. $\frac{1}{50}$ **11.** $\frac{3}{25}$ **12.** $\frac{7}{10}$ **13.** $\frac{11}{20}$ **14.** $\frac{2}{2}$

Write the fraction, decimal, and percent for the shaded part.

15.

16.

17.

Write the fraction, decimal, and percent.

18. 9 out of 10 words correct on a Spelling test.

19. 21 out of 25 problems correct on a Math test.

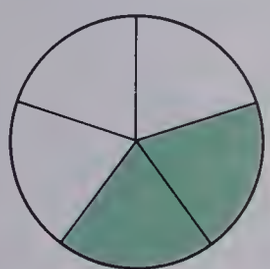
PRACTICE

Write the equivalent percent.

1. $\frac{9}{10}$	**2.** $\frac{4}{5}$	**3.** $\frac{6}{25}$	**4.** $\frac{13}{20}$	**5.** $\frac{27}{50}$
6. $\frac{1}{20}$	**7.** $\frac{3}{10}$	**8.** $\frac{23}{25}$	**9.** $\frac{9}{20}$	**10.** $\frac{17}{50}$

What percent of each figure is shaded?

11.

12. 

13.

Write each test mark as a percent.

14. 19 correct out of 25 questions

15. 48 correct out of 50 questions

16. 11 correct out of 20 questions

17. 1 correct out of 2 questions

18. 4 correct out of 4 questions

19. 39 correct out of 50 questions

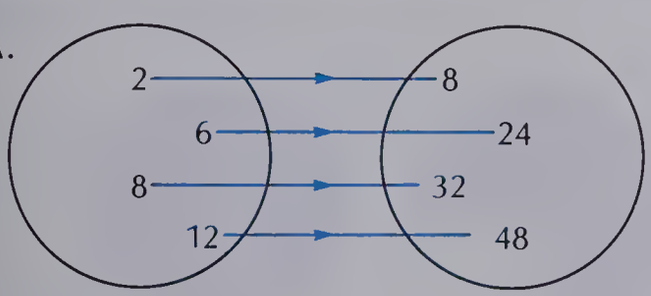
20. 24 correct out of 25 questions

21. 16 correct out of 20 questions

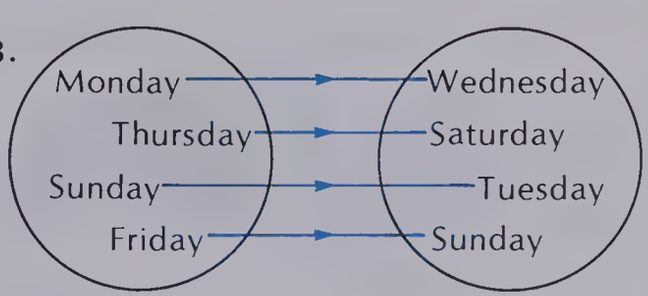
Decide the Rule

For each diagram give the rule as you follow the arrows from left to right.

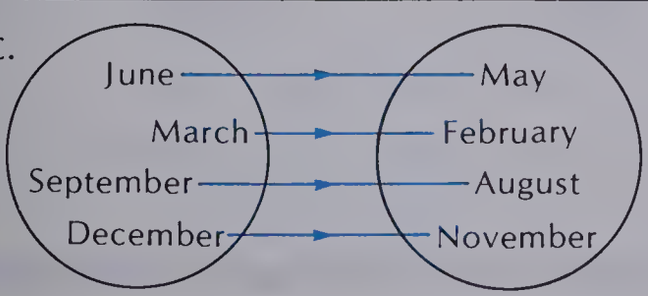
A.



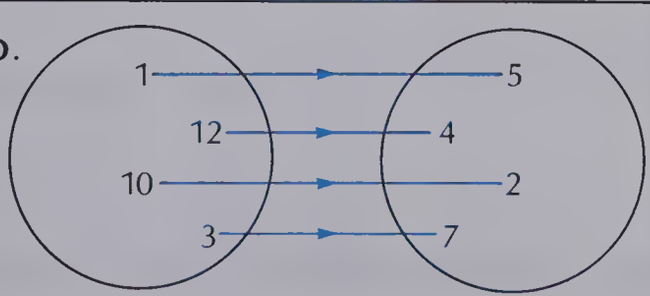
B.



C.



D.



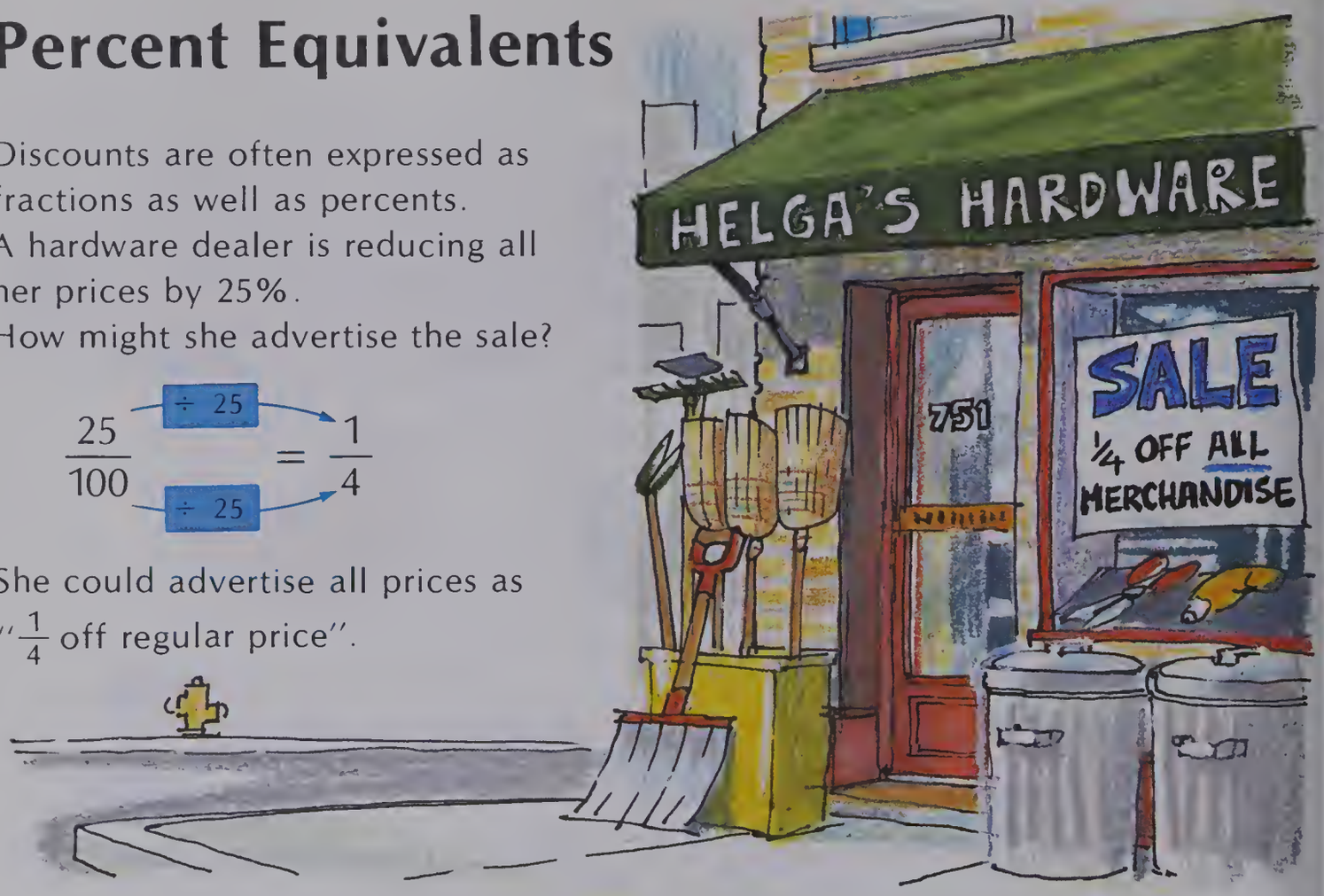
SUNY Institute of Technology

Percent Equivalents

Discounts are often expressed as fractions as well as percents.
A hardware dealer is reducing all her prices by 25%.
How might she advertise the sale?

$$\frac{25}{100} \overset{\div 25}{=} \frac{1}{4}$$

She could advertise all prices as "$\frac{1}{4}$ off regular price".



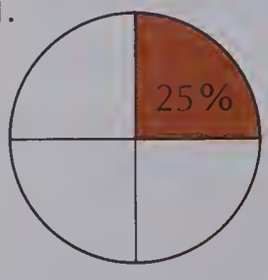
EXERCISES

Write in simplest terms.

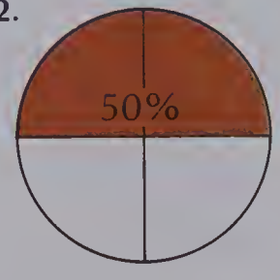
1.	$\frac{25}{100}$	**2.**	$\frac{50}{100}$	**3.**	$\frac{75}{100}$	**4.**	$\frac{100}{100}$	**5.**	$\frac{125}{100}$
6.	$\frac{20}{100}$	**7.**	$\frac{40}{100}$	**8.**	$\frac{60}{100}$	**9.**	$\frac{80}{100}$	**10.**	$\frac{10}{100}$

Write as a fraction in simplest terms.

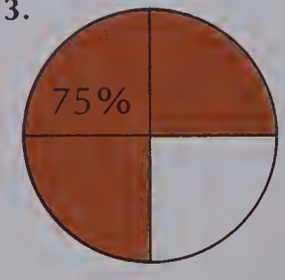
11.



12.



13.



14.

15.	10%	**16.**	20%	**17.**	30%	**18.**	40%	**19.**	50%
20.	4%	**21.**	8%	**22.**	12%	**23.**	16%	**24.**	20%
25.	15%	**26.**	100%	**27.**	2%	**28.**	64%	**29.**	95%

PRACTICE

Write as a fraction in simplest terms.

1. 74%	**2.** 4%	**3.** 45%	**4.** 98%	**5.** 56%
6. 80%	**7.** 2%	**8.** 50%	**9.** 40%	**10.** 5%
11. 18%	**12.** 64%	**13.** 1%	**14.** 48%	**15.** 20%

Copy and compare. Use $<$, $=$, or $>$.

16. 15% ● $\frac{4}{20}$	**17.** 30% ● $\frac{3}{5}$	**18.** 70% ● $\frac{4}{5}$
19. 75% ● $\frac{7}{10}$	**20.** 36% ● $\frac{9}{25}$	**21.** 64% ● $\frac{18}{25}$
22. 11% ● $\frac{1}{10}$	**23.** 55% ● $\frac{11}{20}$	**24.** 2% ● $\frac{2}{50}$
25. 4% ● $\frac{1}{25}$	**26.** 95% ● $\frac{46}{50}$	**27.** 92% ● $\frac{24}{25}$

Write an equivalent fraction in simplest terms.

28. 25% $= \frac{1}{■}$	**29.** 5% $= \frac{1}{■}$	**30.** 1% $= \frac{1}{■}$
$12\frac{1}{2}\% = \frac{1}{■}$	$2\frac{1}{2}\% = \frac{1}{■}$	$\frac{1}{2}\% = \frac{1}{■}$
$6\frac{1}{4}\% = \frac{1}{■}$	$1\frac{1}{4}\% = \frac{1}{■}$	$\frac{1}{10}\% = \frac{1}{■}$
$3\frac{1}{8}\% = \frac{1}{■}$		

Special Sales

To change a fraction to a percent,
find the equivalent decimal first by division.

$$3\overline{)1.000\ldots}\quad 0.333\ldots$$

$\frac{1}{3}$ = 0.33 to the nearest hundredth.
= 33% to the nearest percent.

Write each fraction as a percent (to the nearest percent).

1. $\frac{2}{3}$	**2.** $\frac{1}{6}$	**3.** $\frac{5}{6}$	**4.** $\frac{1}{9}$	**5.** $\frac{2}{9}$	**6.** $\frac{5}{9}$

Percent of a Number

Ellen bought a new record player for $300. She had to pay 7% provincial sales tax. How much tax did she pay?

7% of $300

We can use the decimal form to calculate this.

$7\% = 0.07$

$0.07 \times 300 = 21$

Ellen paid $21 in sales tax.

EXERCISES

Calculate.

1. 5% of 100	**2.** 20% of 100	**3.** 50% of 100
4. 80% of 100	**5.** 100% of 100	**6.** 250% of 100
7. 1% of 100	**8.** 1% of 50	**9.** 1% of 59
10. 10% of 100	**11.** 10% of 30	**12.** 10% of 50
13. 25% of 100	**14.** 25% of 20	**15.** 25% of 36
16. 8% of 59	**17.** 36% of 59	**18.** 75% of 59
19. 46% of 27	**20.** 78% of 18	**21.** 7% of 46
22. 10% of $25	**23.** 16% of $50	**24.** 5% of $18
25. 67% of $110	**26.** 38% of $90	**27.** 55% of $250

PRACTICE

Calculate.

1. 25% of 52	**2.** 70% of 90	**3.** 36% of 25
4. 12% of 75	**5.** 95% of 60	**6.** 15% of 20
7. 64% of 325	**8.** 35% of 480	**9.** 8% of 175
10. 16% of 400	**11.** 40% of 590	**12.** 50% of 488
13. 34% of 300	**14.** 14% of 195	**15.** 69% of 5000
16. 22% of 4200	**17.** 57% of 347	**18.** 3% of 2500
19. 42% of $25	**20.** 16% of $4000	**21.** 75% of $350
22. 8% of $915	**23.** 62% of $500	**24.** 5% of $80

Solve.

25. Mr. Weiss deposited $5000 at the bank. At the end of one year, he collected 15% interest. How much interest did he collect?

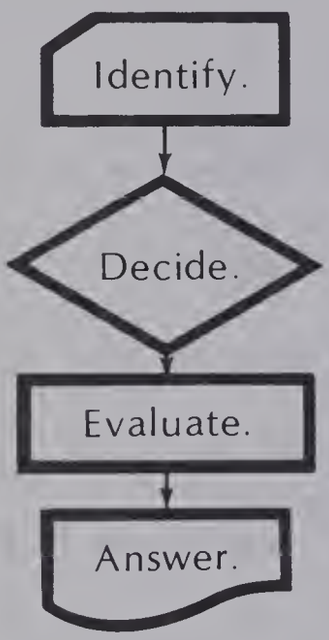
26. The original price of a fur coat is $8500. The discount is 20% of the original price. What is the amount of the discount? What is the sale price of the coat?

USING THE CALCULATOR

Use a calculator to find the sale price of each item.

Percent Problems

Eleven of the fifty people on Brian's paper route are on holidays. What percent of the people are on holidays?



11 out of 50 or $\frac{11}{50}$

Change $\frac{11}{50}$ to a percent.

$$\frac{11}{50} \xrightarrow{\times 2} \frac{22}{100} = 22\%$$

22% of the people were on holidays.

EXERCISES

Find the percent.

1. Edela got 43 out of 50 answers correct on a test. What percent of the answers were wrong?

2. In a sample of 20 cars in a parking lot, 3 were convertibles. What percent of the cars are convertibles?

3. In a school field day, 7 of 10 long jumps were over 3 m. What percent of the jumps were under 3 m?

Find the amount.

4. The cost of a car is $9500. Sales tax is 5% of the cost. What is the amount of sales tax? What is the total cost of the car?

5. The original price of a coat is $200. The discount is 25% of the original price. What is the amount of the discount? What is the sale price?

PRACTICE

Solve.

1. In Layton, which has a population of 5000, 34% of the people live on the west side of the river that runs through the town. How many people live east of the river?

2. 25% of the mail that goes through Beetown's post office goes out of town. 10% goes out of the province.
   a. In a day when they process 860 letters, how many are likely to go out of town?
   b. How many letters would have to be delivered locally?

3. Seville's school board predicts a 12% drop in enrolment next year. There are 6400 students in school this year. How many are there likely to be next year?

4. Mary wrote a math quiz which had 70 questions worth 1 point each and 15 questions worth 2 points each. She answered 80 questions correctly and scored 90%. How many of each type of question did she answer correctly?

REVIEW

N17 Write the equivalent decimal and percent.

1. $\frac{16}{100}$ **2.** $\frac{37}{100}$ **3.** $\frac{70}{100}$ **4.** $\frac{1}{100}$ **5.** $\frac{100}{100}$

N18 Write the equivalent percent.

6. $\frac{3}{4}$ **7.** $\frac{23}{50}$ **8.** $\frac{17}{20}$ **9.** $\frac{10}{10}$ **10.** $\frac{16}{25}$

N19 Write an equivalent fraction in simplest terms.

11. 60% **12.** 72% **13.** 75% **14.** 45% **15.** 6%

A49 Calculate.

16. 25% of 60 **17.** 96% of 50 **18.** 16% of 25

TEST UNIT 9

Solve.

1. 4 boxes cost \$2.80. What is the cost per box?
2. 1 m costs \$7.50. What do 8 m cost?
3. At 190 km in 2 h, how far can a car travel in 8 h?
4. Pat swam 250 m in 5 min. What is her speed in metres per minute?

Write a ratio to compare these numbers of objects.

5. 3 pencils to 2 students
6. 6 pears to 15 plums
7. 18 motorists to 5 cyclists
8. 11 radishes to 8 carrots

Find the value of N.

9. $\frac{8}{11} = \frac{N}{44}$
10. $\frac{N}{7} = \frac{30}{35}$
11. $\frac{9}{13} = \frac{27}{N}$
12. $\frac{7}{N} = \frac{49}{56}$

Write the equivalent decimal and percent.

13. $\frac{68}{100}$
14. $\frac{31}{100}$
15. $\frac{1}{100}$
16. $\frac{105}{100}$

Write the equivalent percent.

17. $\frac{17}{20}$
18. $\frac{1}{5}$
19. $\frac{7}{50}$
20. $\frac{13}{25}$

Write an equivalent fraction in simplest terms.

21. 2%
22. $44\dot{4}\%$
23. 95%
24. 80%

Calculate.

25. 28% of 625
26. 9% of 900
27. 35% of \$18

Solve.

28. 3 cans of beans cost \$1.67. How much will 9 cost?

29. Fifteen people are on an elevator. 9 are men. What percent of the people are men?

LOOKING BACK

MULTIPLICATION

Multiply.

1. $\frac{2}{3} \times 8$
2. $\frac{7}{8} \times 20$
3. $16 \times \frac{1}{6}$
4. $50 \times \frac{5}{12}$
5. $\frac{3}{4} \times \frac{6}{5}$
6. $\frac{1}{2} \times \frac{9}{10}$
7. $\frac{2}{3} \times \frac{11}{12}$
8. $\frac{3}{5} \times \frac{5}{7}$
9. $8 \times 5\frac{1}{2}$
10. $\frac{1}{4} \times 4\frac{4}{5}$
11. $2\frac{2}{3} \times 9$
12. $3\frac{5}{8} \times \frac{2}{5}$
13. $1\frac{3}{5} \times 2\frac{1}{4}$
14. $5\frac{1}{2} \times 2\frac{1}{2}$
15. $5\frac{1}{4} \times 3\frac{1}{5}$
16. $1\frac{3}{4} \times 2\frac{1}{5}$

17. $\begin{array}{r} 6.7 \\ \times\ 18 \\ \hline \end{array}$
18. $\begin{array}{r} 5.08 \\ \times\ 35 \\ \hline \end{array}$
19. $\begin{array}{r} 4.002 \\ \times\ 6 \\ \hline \end{array}$
20. $\begin{array}{r} 7.245 \\ \times\ 69 \\ \hline \end{array}$

21. $\begin{array}{r} 0.3 \\ \times 0.6 \\ \hline \end{array}$
22. $\begin{array}{r} 0.9 \\ \times 0.7 \\ \hline \end{array}$
23. $\begin{array}{r} 0.1 \\ \times 0.1 \\ \hline \end{array}$
24. $\begin{array}{r} 0.5 \\ \times 0.4 \\ \hline \end{array}$

25. $\begin{array}{r} 6.3 \\ \times 2.9 \\ \hline \end{array}$
26. $\begin{array}{r} 4.5 \\ \times 7.1 \\ \hline \end{array}$
27. $\begin{array}{r} 6.5 \\ \times 8.2 \\ \hline \end{array}$
28. $\begin{array}{r} 5.8 \\ \times 3.3 \\ \hline \end{array}$

29. $\begin{array}{r} 0.06 \\ \times\ 0.5 \\ \hline \end{array}$
30. $\begin{array}{r} 0.09 \\ \times\ 0.4 \\ \hline \end{array}$
31. $\begin{array}{r} 0.07 \\ \times\ 0.8 \\ \hline \end{array}$
32. $\begin{array}{r} 0.09 \\ \times\ 0.1 \\ \hline \end{array}$

33. $\begin{array}{r} 6.58 \\ \times\ 2.3 \\ \hline \end{array}$
34. $\begin{array}{r} 7.49 \\ \times\ 4.5 \\ \hline \end{array}$
35. $\begin{array}{r} 3.35 \\ \times\ 8.9 \\ \hline \end{array}$
36. $\begin{array}{r} 8.04 \\ \times\ 5.2 \\ \hline \end{array}$

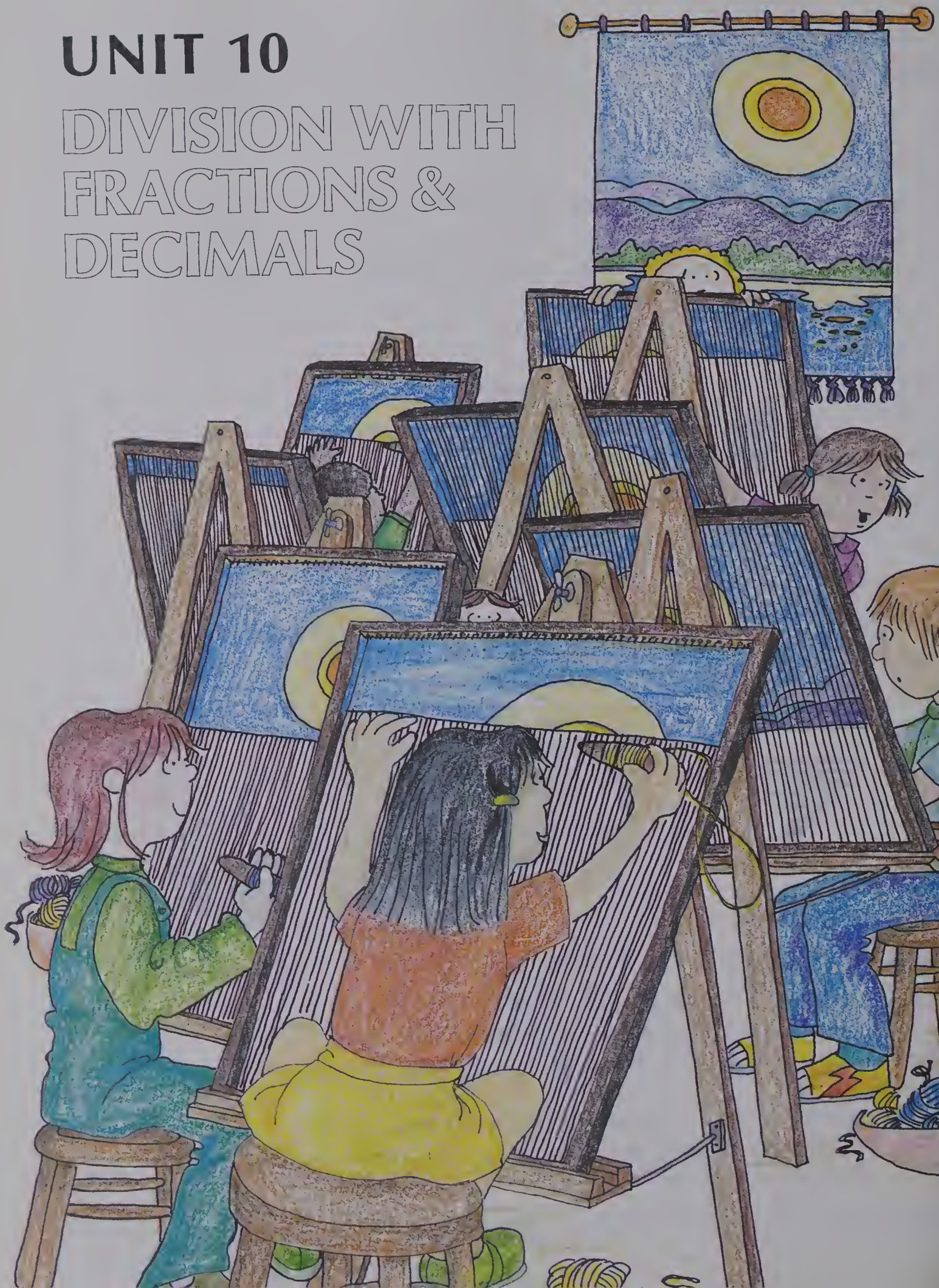
Make a table. Solve the problem.

37. A rectangle has an area of 36 m^2. What are its length and width if it has the smallest possible perimeter?

38. Sandra has a roll of wire fencing 48 m long. What is the largest area that she can enclose using a rectangular shape?

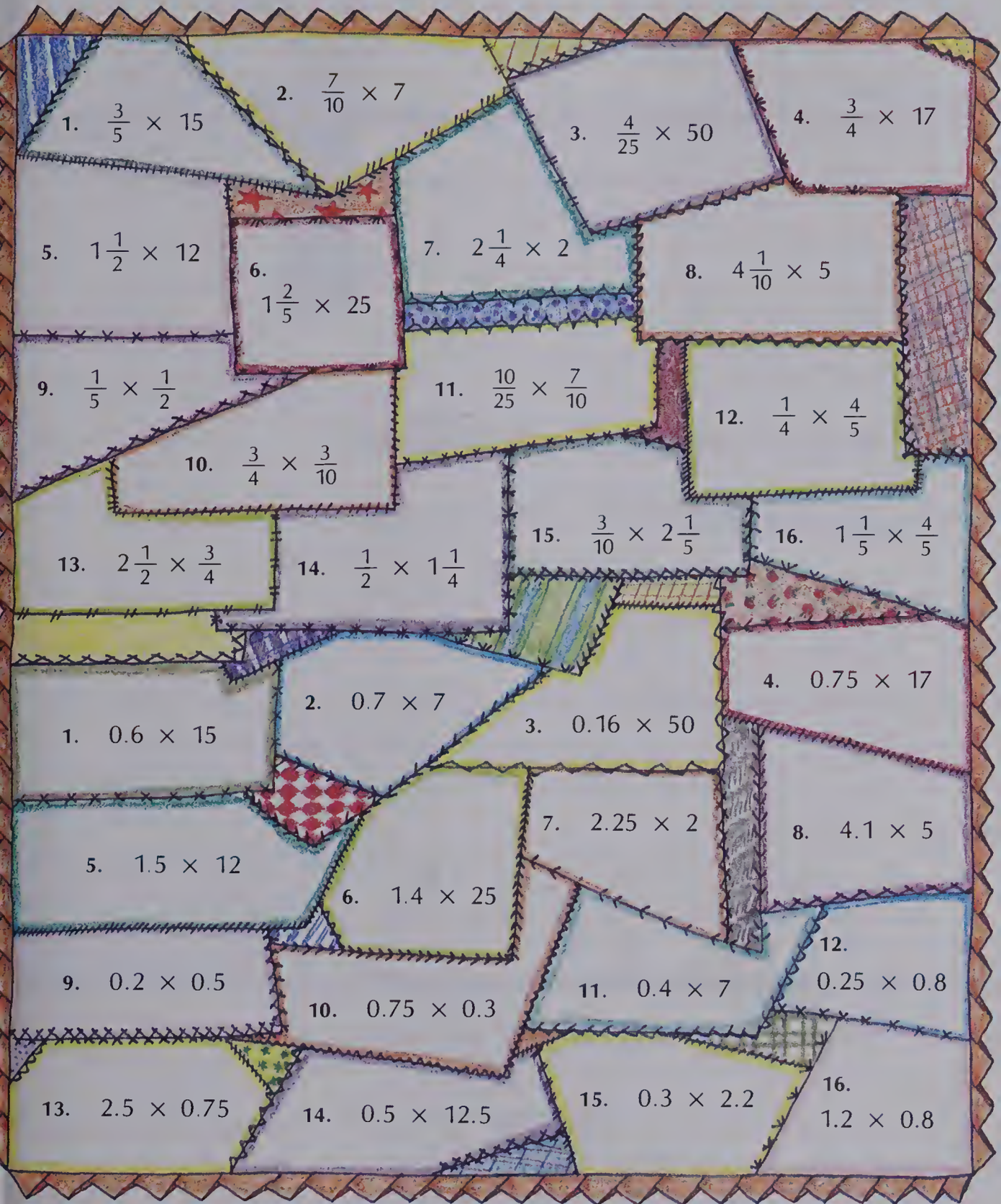
UNIT 10

DIVISION WITH FRACTIONS & DECIMALS



Patchwork Quilt

Multiply.

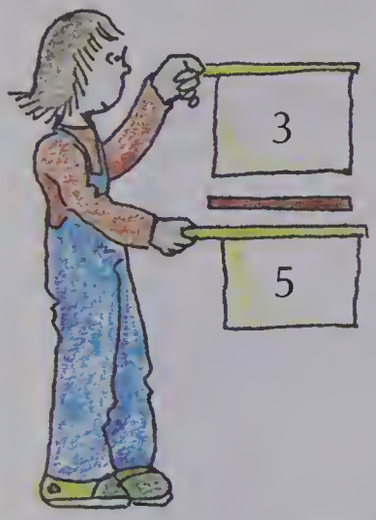


Which set of questions was easier to do?

The answers in the quilts mostly match.

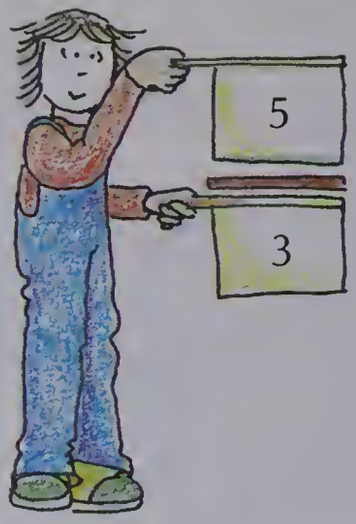
Which two pairs of questions do not match?

Reciprocals



Two numbers whose product is 1 are **reciprocals** of each other.

$\frac{3}{5} \times \frac{5}{3} = \frac{15}{15} = 1$



$\frac{3}{5}$ and $\frac{5}{3}$ are reciprocals of each other.

The reciprocal of $\frac{9}{20}$ is $\frac{20}{9}$, because $\frac{9}{20} \times \frac{20}{9} = \frac{180}{180} = 1$.

The reciprocal of 6 is $\frac{1}{6}$, because $6 \times \frac{1}{6} = \frac{6}{6} = 1$.

EXERCISES

Are the two numbers reciprocals of each other?

1. $\frac{1}{2}$, 2 **2.** $\frac{4}{11}$, $\frac{11}{4}$ **3.** 10, $\frac{1}{10}$ **4.** $\frac{1}{3}$, $\frac{1}{3}$

Copy and complete.

5. $\frac{4}{5} \times \frac{5}{4} = \frac{20}{20} = \blacksquare$ **6.** $7 \times \frac{1}{7} = \frac{7}{7} = \blacksquare$ **7.** $\frac{6}{11} \times \frac{\blacksquare}{\blacksquare} = \frac{66}{66} = 1$

8. $\frac{18}{10} \times \frac{\blacksquare}{\blacksquare} = 1$ **9.** $\frac{\blacksquare}{\blacksquare} \times \frac{4}{3} = 1$ **10.** $\blacksquare \times \frac{1}{8} = 1$

What is the reciprocal of each number? Check by multiplying.

11. $\frac{2}{5}$ **12.** $\frac{3}{5}$ **13.** $\frac{4}{5}$ **14.** $\frac{1}{5}$ **15.** $\frac{5}{7}$

16. $\frac{1}{3}$ **17.** $\frac{2}{3}$ **18.** $1\frac{1}{2}$ **19.** $\frac{3}{10}$ **20.** $\frac{3}{8}$

21. $3\frac{1}{3}$ **22.** 3 **23.** $3\frac{1}{2}$ **24.** $3\frac{1}{4}$ **25.** 8

PRACTICE

Make a chart like this.

Number	Reciprocal	Product
$\frac{1}{2}$	2	$\frac{1}{2} \times 2 = \frac{2}{2} = 1$

List these numbers in the chart. Complete the chart.

1. $\frac{1}{10}$ **2.** $\frac{2}{7}$ **3.** $\frac{11}{4}$ **4.** 3 **5.** 7

6. $\frac{24}{25}$ **7.** 12 **8.** $1\frac{1}{3}$ **9.** $2\frac{2}{5}$ **10.** 9

Copy and complete.

11. $6 \times \blacksquare = 1$ **12.** $\frac{50}{41} \times \blacksquare = 1$ **13.** $1\frac{4}{5} \times \blacksquare = 1$

14. $\frac{2}{9} \times \blacksquare = 1$ **15.** $10 \times \blacksquare = 1$ **16.** $3\frac{1}{3} \times \blacksquare = 1$

17. $\blacksquare \times \frac{6}{7} = 1$ **18.** $\blacksquare \times 2\frac{2}{5} = 1$ **19.** $\blacksquare \times \frac{1}{8} = 1$

Solve.

20. Katia took an hour off work. She promised to work an extra quarter hour every day to make up for it.
How many days will it take her to make up the hour?

21. A leaky pail was losing $\frac{2}{5}$ of its contents every hour.
If it was filled with water, how long would it take for all the contents to leak out?

Puzzler

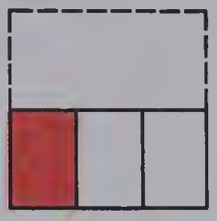
Find a number that does not have a reciprocal.

0 97 100 7 2 10 000 8 $\frac{1}{1000}$ 9 $\frac{1}{10\,000}$ 1000 $\frac{1}{10}$ 10 000 000

Dividing with Fractions

Dana is sewing felt designs on cushions. She has $\frac{1}{2}$ square of red felt left. She wants to make 3 more cushions. How much red felt can she use on each cushion?

$\frac{1}{2}$

$\frac{1}{2} \div 3$ 

The $\frac{1}{2}$ square is divided into 3 parts.
Each new part is $\frac{1}{6}$ of a whole square. } $\frac{1}{2} \div 3 = \frac{1}{6}$

or

Each new part is $\frac{1}{3}$ of a $\frac{1}{2}$ square. } $\frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$

To **divide** a fraction by a whole number, **multiply** by the **reciprocal** of the divisor.

EXERCISES

Copy and complete.

1. $\frac{1}{2} \div 2 = \frac{1}{2} \times \frac{1}{2} = \blacksquare$
2. $\frac{1}{2} \div 3 = \frac{1}{2} \times \frac{1}{3} = \blacksquare$
3. $\frac{1}{2} \div 4 = \frac{1}{2} \times \frac{1}{4} = \blacksquare$
4. $\frac{3}{4} \div 2 = \frac{3}{4} \times \frac{1}{2} = \blacksquare$
5. $\frac{3}{4} \div 3 = \frac{3}{4} \times \frac{1}{3} = \blacksquare$
6. $\frac{3}{4} \div 4 = \frac{3}{4} \times \frac{1}{4} = \blacksquare$

Divide.

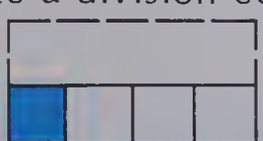
7. $\frac{1}{3} \div 2$
8. $\frac{1}{10} \div 2$
9. $\frac{1}{5} \div 3$
10. $\frac{1}{7} \div 4$
11. $\frac{5}{9} \div 2$
12. $\frac{5}{6} \div 3$
13. $\frac{2}{3} \div 3$
14. $\frac{3}{4} \div 2$
15. $\frac{9}{10} \div 3$
16. $\frac{4}{7} \div 3$
17. $\frac{1}{8} \div 2$
18. $\frac{2}{5} \div 3$

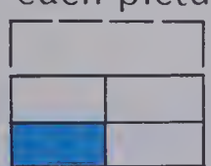
PRACTICE

Divide. Write the answer in simplest terms.

1. $\frac{1}{3} \div 3$
2. $\frac{1}{4} \div 2$
3. $\frac{2}{5} \div 2$
4. $\frac{5}{6} \div 2$
5. $\frac{3}{4} \div 3$
6. $\frac{1}{5} \div 2$
7. $\frac{2}{3} \div 2$
8. $\frac{1}{6} \div 2$
9. $\frac{2}{3} \div 5$
10. $\frac{1}{6} \div 5$
11. $\frac{1}{5} \div 4$
12. $\frac{3}{8} \div 2$
13. $\frac{7}{10} \div 3$
14. $\frac{3}{10} \div 7$
15. $\frac{1}{10} \div 10$
16. $\frac{7}{10} \div 100$
17. $1\frac{1}{2} \div 3$
18. $2\frac{3}{4} \div 2$
19. $1\frac{1}{8} \div 9$
20. $3\frac{2}{3} \div 5$

Write a division equation for each picture.

21. 

22. 

23.

Draw a picture for each division question.

24. $\frac{3}{5} \div 5$
25. $\frac{1}{3} \div 4$
26. $\frac{4}{7} \div 3$
27. $\frac{1}{4} \div 4$

Solve.

28. René has $\frac{2}{3}$ of a bag of chocolate chips. He wants to decorate 6 cupcakes with the chips. What part of the bag of chips should he use on each cupcake?

29. Sara wants to paint 2 model airplanes with $\frac{1}{3}$ of a can of paint. How much paint should she use on each airplane?

Using Reciprocals

We can divide whole numbers by using the reciprocal of the divisor.

$$4 \div 3 = 4 \times \frac{1}{3} = \frac{4}{3} = 1\frac{1}{3}$$

Calculate.

1. $5 \div 3$
2. $22 \div 3$
3. $15 \div 7$
4. $40 \div 9$
5. $100 \div 11$
6. $19 \div 6$
7. $25 \div 12$
8. $10 \div 3$

Dividing by a Fraction

Uri is weaving squares for potholders.
He has 3 balls of yarn. Each potholder uses $\frac{1}{2}$ ball. How many potholders can he make?

How many halves are there in 3 balls?
The diagram shows that he has 6 half-balls of yarn. } $3 \div \frac{1}{2} = 6$

or

He has 3 balls of yarn.
He can make 2 potholders from each ball. } $3 \times 2 = 6$

To **divide** a number by a fraction, **multiply** by the **reciprocal** of the divisor.

EXERCISES

Find how many you can make of each item from 12 balls of yarn.

1.

Balls of Yarn	Item	Number of Balls Needed for One Item	Number of Items
12	sweater	4	$12 \div 4 = \blacksquare$
12	scarf	2	$12 \div 2 = \blacksquare$
12	socks	1	$12 \div 1 = \blacksquare$
12	gloves	$\frac{1}{2}$	$12 \div \frac{1}{2} = \blacksquare$

Divide.

2. $4 \div \frac{1}{3} = 4 \times 3 = \blacksquare$

3. $5 \div \frac{1}{2} = 5 \times 2 = \blacksquare$

4. $3 \div \frac{1}{5} = 3 \times \blacksquare = \blacksquare$

5. $8 \div \frac{1}{4} = 8 \times \blacksquare = \blacksquare$

6. $\frac{1}{2} \div \frac{1}{10} = \frac{1}{2} \times \blacksquare = \blacksquare$

7. $\frac{1}{3} \div \frac{1}{4} = \frac{1}{3} \times \blacksquare = \blacksquare$

8. $\frac{2}{3} \div \frac{1}{2} = \frac{2}{3} \times \blacksquare = \blacksquare$

9. $\frac{4}{5} \div \frac{1}{3} = \frac{4}{5} \times \blacksquare = \blacksquare$

10. $8 \div \frac{1}{3}$ **11.** $\frac{1}{5} \div \frac{1}{2}$ **12.** $\frac{3}{10} \div \frac{1}{3}$ **13.** $\frac{7}{10} \div \frac{1}{7}$

PRACTICE

Draw a diagram to help answer the questions.

1. How many thirds are there in 2?
2. How many quarters are there in 3?
3. How many tenths are there in 2?
4. How many thirds are there in $\frac{2}{3}$?
5. How many fourths are there in $\frac{1}{2}$?

Divide.

6. $6 \div \frac{1}{2}$
7. $7 \div \frac{1}{3}$
8. $\frac{1}{2} \div \frac{1}{3}$
9. $\frac{2}{7} \div \frac{1}{5}$
10. $\frac{1}{8} \div \frac{1}{2}$
11. $8 \div \frac{1}{4}$
12. $\frac{2}{3} \div \frac{1}{5}$
13. $10 \div \frac{1}{5}$
14. $\frac{4}{9} \div \frac{1}{2}$
15. $\frac{3}{7} \div \frac{1}{2}$
16. $12 \div \frac{1}{2}$
17. $\frac{1}{4} \div \frac{1}{6}$

Solve.

18. It takes Marianne half an hour to bake a batch of cookies. How many batches of cookies can she bake in two hours?

19. It takes Tim about a quarter hour to complete each section of his model ship. How many sections will he be able to complete in half an hour?

Infinity?

Write the next five equations in this pattern.

$$1 \div \frac{1}{10} = 10$$

$$1 \div \frac{1}{100} = 100$$

$$1 \div \frac{1}{1000} = 1000$$

What happens to the quotient when the divisor gets smaller and smaller?

Is the divisor getting close to 0 or 1?

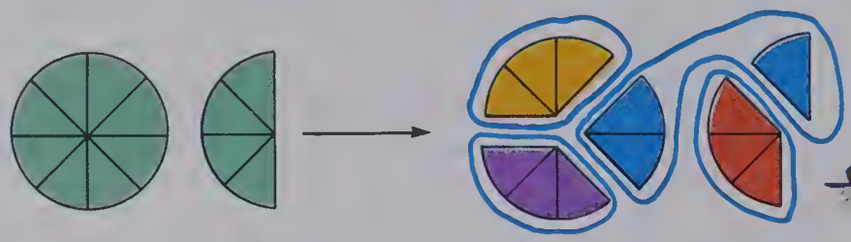
Can you divide 1 by 0? $0\overline{)1}$

Dividing by a Fraction

Sue has $1\frac{1}{2}$ bags of beads. She uses $\frac{3}{8}$ of a bag for each necklace.

How many necklaces can she make?

How many $\frac{3}{8}$s are there in $1\frac{1}{2}$?



$$1\frac{1}{2} \div \frac{3}{8} = \frac{3}{2} \times \frac{8}{3} = \frac{24}{6} = 4$$

reciprocal of the divisor

Sue can make 4 necklaces.

EXERCISES

Copy and complete.

1. $\frac{2}{3} \div \frac{3}{4} = \frac{2}{3} \times \frac{4}{3} = \blacksquare$

2. $\frac{1}{2} \div \frac{3}{5} = \frac{1}{2} \times \frac{5}{3} = \blacksquare$

3. $8 \div \frac{2}{3} = 8 \times \blacksquare = \frac{24}{2} = \blacksquare$

4. $6 \div \frac{4}{5} = 6 \times \blacksquare = \frac{30}{4} = \blacksquare$

5. $1\frac{1}{3} \div \frac{2}{7} = \frac{4}{3} \times \blacksquare = \blacksquare$

6. $2\frac{1}{2} \div \frac{2}{3} = \frac{5}{2} \times \blacksquare = \blacksquare$

Divide. Write the quotient in simplest terms.

7. $\frac{1}{5} \div \frac{2}{3}$

8. $\frac{1}{2} \div \frac{5}{8}$

9. $\frac{3}{4} \div \frac{1}{2}$

10. $\frac{3}{8} \div \frac{3}{4}$

11. $8 \div \frac{3}{4}$

12. $6 \div \frac{5}{8}$

13. $1\frac{1}{4} \div \frac{3}{5}$

14. $2\frac{1}{3} \div \frac{3}{4}$

15. $3\frac{2}{4} \div \frac{1}{8}$

16. $4\frac{1}{5} \div \frac{4}{10}$

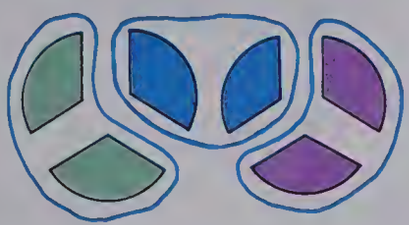
17. $7 \div \frac{1}{6}$

18. $2\frac{5}{8} \div \frac{5}{6}$

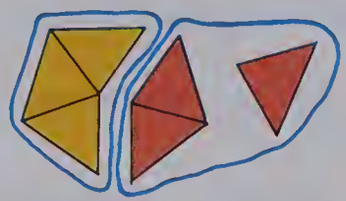
PRACTICE

Write a division question. Solve it.

1. How many $\frac{2}{3}$s are there in 2?



2. How many $\frac{3}{5}$s are there in $1\frac{1}{5}$?



Divide.

3. $\frac{1}{3} \div \frac{3}{4}$
4. $\frac{7}{8} \div \frac{2}{5}$
5. $5 \div \frac{2}{3}$
6. $1\frac{1}{8} \div \frac{3}{4}$
7. $6 \div \frac{2}{3}$
8. $\frac{3}{5} \div \frac{1}{4}$
9. $2\frac{1}{2} \div \frac{5}{6}$
10. $\frac{1}{2} \div \frac{3}{4}$
11. $\frac{8}{9} \div \frac{2}{3}$
12. $3 \div \frac{2}{3}$
13. $1\frac{4}{5} \div \frac{3}{4}$
14. $\frac{2}{3} \div \frac{2}{3}$
15. $4 \div \frac{3}{5}$
16. $\frac{2}{3} \div \frac{3}{5}$
17. $1\frac{1}{5} \div \frac{2}{3}$
18. $\frac{5}{8} \div \frac{2}{3}$

Solve.

19. Carter has $2\frac{1}{2}$ boxes of tacks. If he uses $\frac{2}{3}$ of a box for each tack picture, how many pictures can he make?

REVIEW

N20 Write the reciprocal of each number.

1. $\frac{1}{8}$
2. 3
3. $\frac{4}{9}$

A50 Divide.

4. $\frac{1}{5} \div 2$
5. $\frac{5}{6} \div 3$
6. $\frac{3}{4} \div 4$

A51

7. $4 \div \frac{1}{2}$
8. $\frac{1}{3} \div \frac{1}{5}$
9. $\frac{4}{5} \div \frac{1}{3}$

A52

10. $\frac{2}{3} \div \frac{3}{5}$
11. $3 \div \frac{3}{4}$
12. $1\frac{1}{2} \div \frac{2}{3}$

Dividing Decimals

Dominic bought 2.6 m of leather thong. He cut it into 4 equal lengths. How long is each piece?

$$2.6 \div 4 = ?$$

Put a decimal point in the quotient.

$$4\overline{)2.6}$$

No ones.

$$\begin{array}{r} 0. \\ 4\overline{)2.6} \end{array}$$

Divide.

$$\begin{array}{r} 0.6 \\ 4\overline{)2.6} \\ -24 \\ \hline 2 \end{array}$$

Write 2.6 as 2.60 and divide again.

$$\begin{array}{r} 0.65 \\ 4\overline{)2.60} \\ -24 \\ \hline 20 \\ -20 \\ \hline 0 \end{array}$$

Each piece will be 0.65 m long.

EXERCISES

Divide.

1. $3\overline{)69}$	2. $3\overline{)6.9}$	3. $3\overline{)0.69}$	4. $3\overline{)0.069}$
5. $4\overline{)12}$	6. $4\overline{)1.2}$	7. $4\overline{)0.12}$	8. $4\overline{)0.012}$
9. $21\overline{)441}$	10. $21\overline{)44.1}$	11. $21\overline{)4.41}$	12. $21\overline{)0.441}$
13. $5\overline{)0.5}$	14. $7\overline{)8.4}$	15. $6\overline{)14.4}$	16. $4\overline{)467.6}$
17. $7\overline{)0.07}$	18. $8\overline{)0.56}$	19. $5\overline{)2.25}$	20. $6\overline{)80.64}$

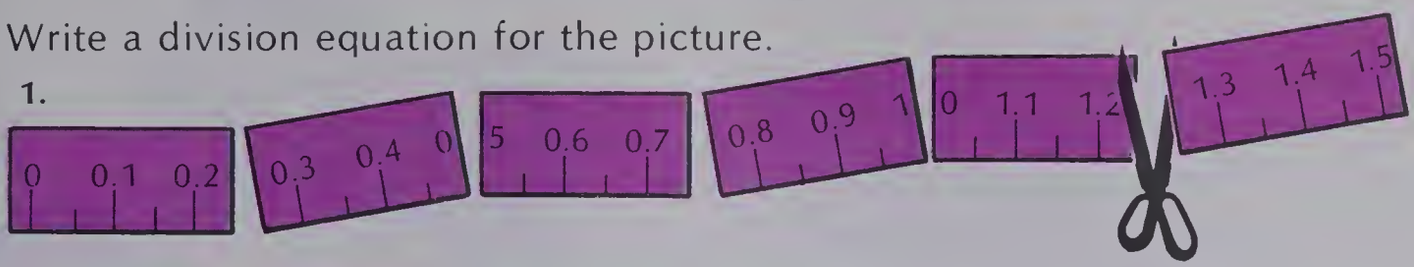
Divide. You may need to write more zeros in the dividend.

21. $5\overline{)2.4}$	22. $5\overline{)6.9}$	23. $4\overline{)2.2}$	24. $4\overline{)10.5}$
25. $25\overline{)6.5}$	26. $25\overline{)15.2}$	27. $15\overline{)22.5}$	28. $6\overline{)2.25}$
29. $5\overline{)23}$	30. $10\overline{)58}$	31. $25\overline{)710}$	32. $4\overline{)815}$

PRACTICE

Write a division equation for the picture.

1.



Divide.

2. $8\overline{)0.08}$	**3.** $12\overline{)3.6}$	**4.** $15\overline{)0.45}$	**5.** $4\overline{)22.4}$
6. $33\overline{)9.9}$	**7.** $7\overline{)0.091}$	**8.** $7\overline{)14.7}$	**9.** $25\overline{)7.5}$
10. $35\overline{)8.75}$	**11.** $8\overline{)33}$	**12.** $6\overline{)0.456}$	**13.** $13\overline{)15.6}$
14. $5\overline{)8.37}$	**15.** $16\overline{)20}$	**16.** $9\overline{)4.05}$	**17.** $26\overline{)0.182}$
18. $3.08 \div 14$	**19.** $5 \div 8$	**20.** $0.81 \div 27$	**21.** $18.2 \div 100$
22. $12.6 \div 42$	**23.** $0.328 \div 82$	**24.** $2.9 \div 25$	**25.** $98 \div 16$

Solve.

26. The mass of 48 links in a gold chain is 99.36 g.
What is the mass of each link?

27. Sandra's car used 51 L of gasoline on a trip of 400 km.
At that rate, how much gas would she use to drive 100 km?

Budgets

Janis kept a record of her expenses for a week. She wanted to know what percent each item was.
Her allowance is $6. She spent $1.50 for a movie.

$1.50 \div 6 = 0.25$

She spent 25% of her allowance on a movie.
What percent did she spend on each of the other items?

Movie	$1.50
Ice cream	0.60
Transportation	0.90
Apples	0.48
Amusement park	2.28
Savings	0.24
Total	$6.00

Dividing by Tenths

Helene is doing cross-stitch embroidery on a towel. The border is 5.1 cm wide. Each row is 0.3 cm wide. How many rows are in the border?

$5.1 \div 0.3 = ?$

$$\frac{5.1}{0.3} = \frac{5.1 \times 10}{0.3 \times 10} = \frac{51}{3}$$

$0.3\overline{)5.1}$

Multiply the divisor and the dividend by 10.

$0.3\overline{)5.1}$

Divide.

$$3\overline{)51}$$

$$\begin{array}{r} 17 \\ 3\overline{)\,51} \\ -3 \\ \hline 21 \\ -21 \\ \hline 0 \end{array}$$

There are 17 rows in the border.

EXERCISES

Multiply each number by 10.

1. 20	**2.** 2	**3.** 0.2	**4.** 0.02	**5.** 0.002
6. 1.2	**7.** 0.12	**8.** 0.012	**9.** 0.16	**10.** 2.4

Divide.

11. $0.6\overline{)0.3}$	**12.** $0.6\overline{)6.3}$	**13.** $1.2\overline{)4.8}$	**14.** $3.5\overline{)10.5}$
15. $0.3\overline{)0.72}$	**16.** $0.2\overline{)0.32}$	**17.** $2.5\overline{)1.75}$	**18.** $1.6\overline{)5.44}$
19. $0.2\overline{)0.824}$	**20.** $0.5\overline{)6.375}$	**21.** $3.6\overline{)1.008}$	**22.** $4.7\overline{)1.645}$
23. $0.2\overline{)4}$	**24.** $0.3\overline{)18}$	**25.** $3.6\overline{)144}$	**26.** $2.8\overline{)4480}$
27. $0.4\overline{)3}$	**28.** $1.6\overline{)30}$	**29.** $0.8\overline{)9.1}$	**30.** $2.5\overline{)6.2}$

PRACTICE

Find the quotient.

1. $0.3\overline{)6}$
2. $0.2\overline{)0.8}$
3. $2.4\overline{)62.4}$
4. $0.3\overline{)0.09}$
5. $0.2\overline{)0.006}$
6. $0.4\overline{)48}$
7. $0.4\overline{)0.68}$
8. $1.3\overline{)3.9}$
9. $1.5\overline{)225}$
10. $0.3\overline{)0.057}$
11. $0.5\overline{)9.05}$
12. $0.4\overline{)0.512}$

Divide. Check the answer.

13. $0.7\overline{)39.48}$
14. $2.3\overline{)69}$
15. $0.6\overline{)5.676}$
16. $1.5\overline{)4.5}$
17. $3.1\overline{)89.9}$
18. $0.5\overline{)831.5}$
19. $2.7\overline{)0.81}$
20. $3.8\overline{)0.228}$

Solve.

21. Some heavy string costs 7.5¢/m. How much string could you buy for $1.35?

22. Sara ran 100 m in 12.5 s.
    a. What was her speed in metres per second?
    b. What was her speed in metres per hour?
    c. What was her speed in kilometres per hour?

23. Mark's wallpaper strips are 0.8 m wide. How many strips does he need to paper a wall that is 5.5 m wide?

Computer Tutor

DATA		
A	B	C
7.2	1.2	2.8

What will the computer print for each program?
Watch for special symbols. * means multiply, / means divide.

a.
```
1 READ A, C
2 D = A + C
3 PRINT D
4 END
```

b.
```
1 READ B, C
2 E = B * C
3 PRINT E
4 END
```

c.
```
1 READ A, B
2 F = A / B
3 PRINT F
4 END
```

Dividing by Hundredths

Louis is cutting pieces of rope so the class can practise tying knots. He is cutting the rope into 0.55 m lengths. He has 13.2 m of rope.
How many pieces will he have?

$13.2 \div 0.55 = ?$

$$\frac{13.2}{0.55} = \frac{13.2 \times 100}{0.55 \times 100} = \frac{1320}{55}$$

Multiply the divisor and dividend by 100.

$0.55\overline{)13.2}$ → $0.55\overline{)13.20}$

Divide.

$$55\overline{)1320}$$

$$\begin{array}{r} 24 \\ -110 \\ \hline 220 \\ -220 \\ \hline 0 \end{array}$$

Check.

$$\begin{array}{r} 24 \\ \times 0.55 \\ \hline 120 \\ 120 \\ \hline 13.20 \end{array}$$

Louis will have 24 pieces of rope.

EXERCISES

Multiply each number by 100.

1. 30	**2.** 3	**3.** 0.3	**4.** 0.03	**5.** 0.003
6. 0.4	**7.** 0.04	**8.** 0.004	**9.** 1.8	**10.** 21.43

Divide.

11. $0.02\overline{)6}$	**12.** $0.08\overline{)32}$	**13.** $0.12\overline{)48}$	**14.** $0.25\overline{)375}$
15. $0.03\overline{)3.6}$	**16.** $0.04\overline{)8.4}$	**17.** $0.15\overline{)7.5}$	**18.** $0.23\overline{)4.6}$
19. $0.04\overline{)0.24}$	**20.** $0.05\overline{)1.25}$	**21.** $0.13\overline{)0.39}$	**22.** $0.41\overline{)1.64}$
23. $0.05\overline{)0.355}$	**24.** $0.06\overline{)4.266}$	**25.** $0.16\overline{)0.048}$	**26.** $0.33\overline{)0.165}$
27. $0.16\overline{)9}$	**28.** $0.32\overline{)7.8}$	**29.** $0.95\overline{)1.634}$	**30.** $0.77\overline{)66.99}$

PRACTICE

Find the quotient.

1. $0.02\overline{)0.6}$ **2.** $0.04\overline{)76}$ **3.** $0.05\overline{)1.35}$ **4.** $0.06\overline{)3.132}$

5. $0.04\overline{)0.008}$ **6.** $0.04\overline{)59.2}$ **7.** $0.05\overline{)871.5}$ **8.** $0.08\overline{)29.36}$

9. $0.12\overline{)384}$ **10.** $0.14\overline{)5.88}$ **11.** $0.09\overline{)847.8}$ **12.** $0.92\overline{)110.4}$

Divide. Check the answer.

13. $0.23\overline{)0.575}$ **14.** $0.56\overline{)1.12}$ **15.** $0.23\overline{)0.92}$ **16.** $0.17\overline{)8.5}$

17. $0.32\overline{)7.68}$ **18.** $1.4\overline{)11.2}$ **19.** $0.52\overline{)0.208}$ **20.** $0.18\overline{)9}$

21. $2.52 \div 21$ **22.** $37.6 \div 0.08$ **23.** $0.21 \div 1.1$

24. $7 \div 0.05$ **25.** $14.4 \div 0.06$ **26.** $3.38 \div 0.26$

Solve.

27. Alf is buying strips of balsa wood to make model airplanes. A one-metre strip sells for \$0.89. How much wood can he buy for \$22.25?

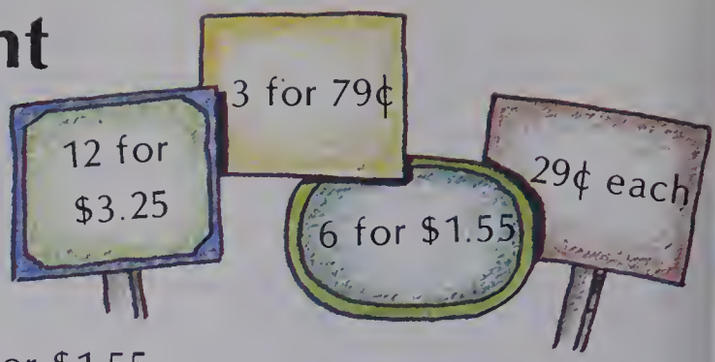
28. A 4.5 kg package of birdseed usually lasts for 18 weeks. The store only has 3 kg packages. How long should the 3 kg package last?

Missing Digits

Copy and complete the division.

$$
\begin{array}{r}
0.\blacksquare 3 \\
0.\blacksquare\blacksquare \overline{)\ \blacksquare\blacksquare.8\blacksquare} \\
-\blacksquare 4\ \blacksquare \\
\hline
8\blacksquare \\
-\blacksquare\blacksquare \\
\hline
0
\end{array}
$$

Rounding the Quotient



Marikka checked various stores to compare prices of grapefruit. She calculated the price of **one** grapefruit in each store.
Frederick's Market had the best buy at 6 for $1.55.
What was the price of one grapefruit at Frederick's?

$6\overline{)1.55}$

Divide.

$$\begin{array}{r} 0.258 \\ 6\overline{)1.550} \\ -12 \\ \hline 35 \\ -30 \\ \hline 50 \\ -48 \\ \hline 2 \end{array}$$

Round to the nearest hundredth.

0.26

Grapefruit are about 26¢ each at Frederick's.

EXERCISES

Round to the nearest hundredth.

1. 0.378	**2.** 1.4251	**3.** 67.043	**4.** 0.019
5. 6.4222	**6.** 0.666	**7.** 1.414	**8.** 29.395

Divide. Round the quotient to the nearest hundredth.

9. $7\overline{)1}$	**10.** $9\overline{)1}$	**11.** $11\overline{)1}$	**12.** $13\overline{)1}$
13. $3\overline{)0.1}$	**14.** $6\overline{)0.4}$	**15.** $15\overline{)0.35}$	**16.** $23\overline{)6.247}$
17. $0.3\overline{)16}$	**18.** $0.9\overline{)2.9}$	**19.** $0.14\overline{)0.51}$	**20.** $0.36\overline{)7.318}$

Divide. Round the quotient to the nearest tenth.

21. $3\overline{)2}$	**22.** $17\overline{)1}$	**23.** $0.6\overline{)0.1}$	**24.** $0.15\overline{)1.072}$

PRACTICE

Divide. Round the quotient to the nearest tenth.

1. $8\overline{)150}$
2. $6\overline{)1.3}$
3. $5\overline{)0.59}$
4. $4\overline{)0.235}$
5. $0.7\overline{)237}$
6. $0.5\overline{)4.3}$
7. $0.3\overline{)0.35}$
8. $0.06\overline{)0.017}$

Divide. Round the quotient to the nearest hundredth.

9. $23\overline{)342}$
10. $3.4\overline{)413}$
11. $48\overline{)2.9}$
12. $12\overline{)1}$
13. $15\overline{)0.2}$
14. $1.6\overline{)0.35}$
15. $0.08\overline{)0.131}$
16. $0.25\overline{)6}$
17. $0.4\overline{)0.213}$
18. $0.7\overline{)1.5}$
19. $1.9\overline{)2}$
20. $0.13\overline{)4.6}$

Solve.

21. Twelve marbles have a mass of 70 g. What is the mass of one marble to the nearest tenth of a gram?

22. What is the better buy for oranges — 12 for \$1.69 **or** 14¢ each?

23. A candle mold holds 0.18 L of wax. How many candles can you make with 3 L of wax?

USING THE CALCULATOR

Estimate each quotient mentally.
Then divide on a calculator.
Round the quotients to the nearest thousandth.

1. $0.54 \div 0.7$
2. $6.98 \div 0.3$
3. $75.25 \div 0.9$
4. $68 \div 0.77$
5. $85.4 \div 0.33$
6. $69.22 \div 0.54$
7. $9 \div 1.54$
8. $55.2 \div 6.35$
9. $8 \div 0.127$

Find the differences between your estimates and the calculations.
You win the challenge if the sum of your differences is less than 100.

Expressing Fractions as Decimals

Jennifer likes to use decimals instead of fractions when she uses her calculator. What decimal would she use in a problem that involves multiplying by $\frac{3}{8}$?

$8\overline{)3}$

$$\begin{array}{r} 0.375 \\ 8\overline{)3.000} \\ -24 \\ \hline 60 \\ -56 \\ \hline 40 \\ -40 \\ \hline 0 \end{array}$$

$\frac{3}{8} = 0.375$

To change a fraction to a decimal, divide the numerator by the denominator.

EXERCISES

Express the fraction as a decimal.
Divide until the remainder is zero.

1. $\frac{1}{2}$	**2.** $\frac{1}{4}$	**3.** $\frac{3}{4}$	**4.** $\frac{1}{5}$	**5.** $\frac{2}{5}$
6. $\frac{3}{5}$	**7.** $\frac{4}{5}$	**8.** $\frac{1}{8}$	**9.** $\frac{5}{8}$	**10.** $\frac{7}{8}$
11. $\frac{1}{20}$	**12.** $\frac{3}{20}$	**13.** $\frac{9}{20}$	**14.** $\frac{11}{20}$	**15.** $\frac{19}{20}$
16. $\frac{1}{25}$	**17.** $\frac{9}{25}$	**18.** $\frac{17}{25}$	**19.** $\frac{1}{50}$	**20.** $\frac{23}{50}$

Express the fraction as a decimal to the nearest tenth.

21. $\frac{5}{8}$	**22.** $\frac{1}{3}$	**23.** $\frac{2}{15}$	**24.** $\frac{4}{7}$	**25.** $\frac{7}{9}$

Express the fraction as a decimal to the nearest hundredth.

26. $\frac{2}{3}$	**27.** $\frac{7}{8}$	**28.** $\frac{5}{9}$	**29.** $\frac{1}{14}$	**30.** $\frac{5}{6}$

PRACTICE

Express the fraction as a decimal. Divide until the remainder is zero.

1. $\frac{1}{20}$ **2.** $\frac{3}{25}$ **3.** $\frac{3}{50}$ **4.** $\frac{7}{8}$ **5.** $\frac{29}{50}$

6. $\frac{4}{25}$ **7.** $\frac{1}{16}$ **8.** $\frac{3}{2}$ **9.** $\frac{6}{5}$ **10.** $\frac{11}{8}$

Express the fraction as a decimal to the nearest tenth.

11. $\frac{1}{9}$ **12.** $\frac{3}{7}$ **13.** $\frac{3}{8}$ **14.** $\frac{1}{6}$ **15.** $\frac{2}{11}$

Express the fraction as a decimal to the nearest hundredth.

16. $\frac{1}{15}$ **17.** $\frac{1}{30}$ **18.** $\frac{37}{60}$ **19.** $\frac{7}{11}$ **20.** $\frac{5}{18}$

Complete these inequations using $>$ or $<$. Use decimals to help.

21. $\frac{9}{8} \bullet \frac{12}{11}$ **22.** $\frac{7}{4} \bullet \frac{28}{15}$ **23.** $\frac{65}{50} \bullet \frac{4}{3}$

24. $\frac{8}{29} \bullet \frac{3}{11}$ **25.** $\frac{5}{14} \bullet \frac{17}{47}$ **26.** $\frac{9}{13} \bullet \frac{24}{35}$

Solve.

27. Mario got 21 right answers out of 25 and Jean got 29 out of 35. Who got the better score?

28. $\frac{22}{7}$ is sometimes used as an approximate value for **pi**. What is $\frac{22}{7}$ to the nearest hundredth?

Decimal Designs

Express each fraction as a decimal. Divide until you have four decimal places in the quotient. Do not round.

a. $\frac{1}{9}$ **b.** $\frac{2}{9}$ **c.** $\frac{3}{9}$ **d.** $\frac{4}{9}$ **e.** $\frac{5}{9}$

Notice the pattern. Write the decimal for $\frac{6}{9}$, $\frac{7}{9}$, $\frac{8}{9}$.

Express these fractions as decimals. Divide until you have four decimal places. Do not round.

f. $\frac{1}{11}$ **g.** $\frac{2}{11}$ **h.** $\frac{3}{11}$ **i.** $\frac{4}{11}$ **j.** $\frac{5}{11}$

Now write the decimal for $\frac{6}{11}$, $\frac{7}{11}$, $\frac{8}{11}$, $\frac{9}{11}$, $\frac{10}{11}$.

Problem Solving

Julio is three times as old as Rosa.
In five years, he will be only two times as old.
How old are Julio and Rosa now?

If you are not sure where to begin, choose two reasonable numbers and test them.

Guess: **30** and **10** Test: In five years, they will be 35 and 15.
But $2 \times 15 \neq 35$.

Guess: **21** and **7** Test: In five years, they will be 26 and 12.
But $2 \times 12 \neq 26$. (**But** — it's closer.)

Guess: **15** and **5** Test: In five years, they will be 20 and 10.
$2 \times 10 = 20$

Julio is 15 years old and Rosa is 5 years old now.

EXERCISES

Solve.

1. A number multiplied by itself is 225. What is the number?
   $12 \times 12 = 144$ (too small)
   $20 \times 20 = 400$ (too big)
   $17 \times 17 = 289$ (too big)

2. A rectangular field has an area of 48 m^2 and a perimeter of 38 m. What are its dimensions?
   To have an area of 48 m^2, the dimensions could be 8×6, or 12×4, or 16×3 or 48×1.
   Which of these give a perimeter of 38 m?

3. If Larry multiplies his age by 3, adds 6, and divides by 3, the result is 15. How old is Larry?
   Try 8: $8 \times 3 = 24$; $24 + 6 = 30$; $30 \div 3 = 10$
   Try 12: $12 \times 3 = 36$; $36 + 6 = 42$; $42 \div 3 = 14$

PRACTICE

Solve.

1. A craft fair charged \$5 admission for adults and \$2 for children. For the first 150 people admitted, the proceeds were \$600. How many of these people were adults and how many were children?

2. Three years ago, Beth was 3 times as old as Ian. Now she is 8 years older than Ian. How old are Beth and Ian now?

3. I am thinking of a number. If I triple it and then subtract 8, the result is 13. What is the number?

4. Nicole has 8 coins in her purse. They total \$1.15. How many quarters, dimes, and nickels does she have?

5. A rectangular garden has an area of 36 m^2 and a perimeter of 30 m. What are its dimensions?

REVIEW

A53 Divide.

1. $8\overline{)0.16}$ 2. $12\overline{)3.6}$ 3. $5\overline{)1.245}$

A54

4. $0.4\overline{)96}$ 5. $0.3\overline{)0.057}$ 6. $2.7\overline{)0.81}$

A55

7. $0.05\overline{)871.5}$ 8. $0.13\overline{)0.78}$ 9. $0.33\overline{)1.65}$

A56 Divide. Round the quotient to the nearest hundredth.

10. $14\overline{)0.2}$ 11. $2.6\overline{)0.371}$ 12. $0.09\overline{)12}$

A57 Express the fraction as a decimal. Divide until the remainder is zero.

13. $\frac{5}{8}$ 14. $\frac{9}{36}$ 15. $\frac{7}{5}$

TEST UNIT 10

What is the reciprocal?

1. $\frac{1}{5}$ **2.** $\frac{2}{3}$ **3.** 6 **4.** $\frac{1}{10}$

Divide.

5. $\frac{5}{9} \div 3$ **6.** $\frac{2}{3} \div 2$ **7.** $\frac{1}{4} \div 3$ **8.** $\frac{3}{8} \div 2$

9. $5 \div \frac{1}{2}$ **10.** $\frac{1}{4} \div \frac{1}{3}$ **11.** $\frac{5}{6} \div \frac{1}{4}$ **12.** $6 \div \frac{1}{8}$

13. $\frac{1}{3} \div \frac{3}{4}$ **14.** $7 \div \frac{2}{5}$ **15.** $2\frac{1}{2} \div \frac{3}{8}$ **16.** $\frac{5}{6} \div \frac{3}{5}$

17. $8\overline{)0.8}$ **18.** $4\overline{)17.2}$ **19.** $5\overline{)2.95}$

20. $0.6\overline{)18}$ **21.** $0.4\overline{)0.72}$ **22.** $1.2\overline{)0.084}$

23. $0.05\overline{)0.455}$ **24.** $0.07\overline{)2.8}$ **25.** $0.16\overline{)6.56}$

Divide. Round the quotient to the nearest hundredth.

26. $0.8\overline{)2.9}$ **27.** $9\overline{)2}$ **28.** $1.7\overline{)0.98}$

Express the fraction as a decimal.
Divide until the remainder is zero.

29. $\frac{7}{8}$ **30.** $\frac{7}{50}$ **31.** $\frac{4}{5}$ **32.** $\frac{28}{25}$

Solve.

33. Apples cost 18¢ each and oranges cost 21¢ each. Kim bought 7 pieces of fruit for $1.32. How many apples and how many oranges did she buy?

LOOKING BACK

RATIOS

Solve.

1. 3 cans cost $12.24. What is the cost per can?
2. Tom ran 2000 m in 10 min. What is his speed in metres per minute?
3. 1 L costs $2.95. What do 6 L cost?
4. At 180 km in 3 h, how far would a bicycle travel in 6 h?

Write a ratio to compare these numbers of objects.

5. 8 books to 5 students
6. 3 bananas to 5 plums
7. 12 patients to 2 doctors
8. 11 beans to 6 radishes

Find the value of N.

9. $\frac{6}{7} = \frac{N}{28}$
10. $\frac{N}{9} = \frac{20}{45}$
11. $\frac{5}{11} = \frac{45}{N}$
12. $\frac{8}{N} = \frac{64}{72}$

Write the equivalent decimal and percent.

13. $\frac{27}{100}$
14. $\frac{49}{100}$
15. $\frac{2}{100}$
16. $\frac{109}{100}$

Write the equivalent percent.

17. $\frac{19}{25}$
18. $\frac{1}{20}$
19. $\frac{7}{20}$
20. $\frac{39}{50}$

Write an equivalent fraction in simplest terms.

21. 5%
22. 32%
23. 85%
24. 60%

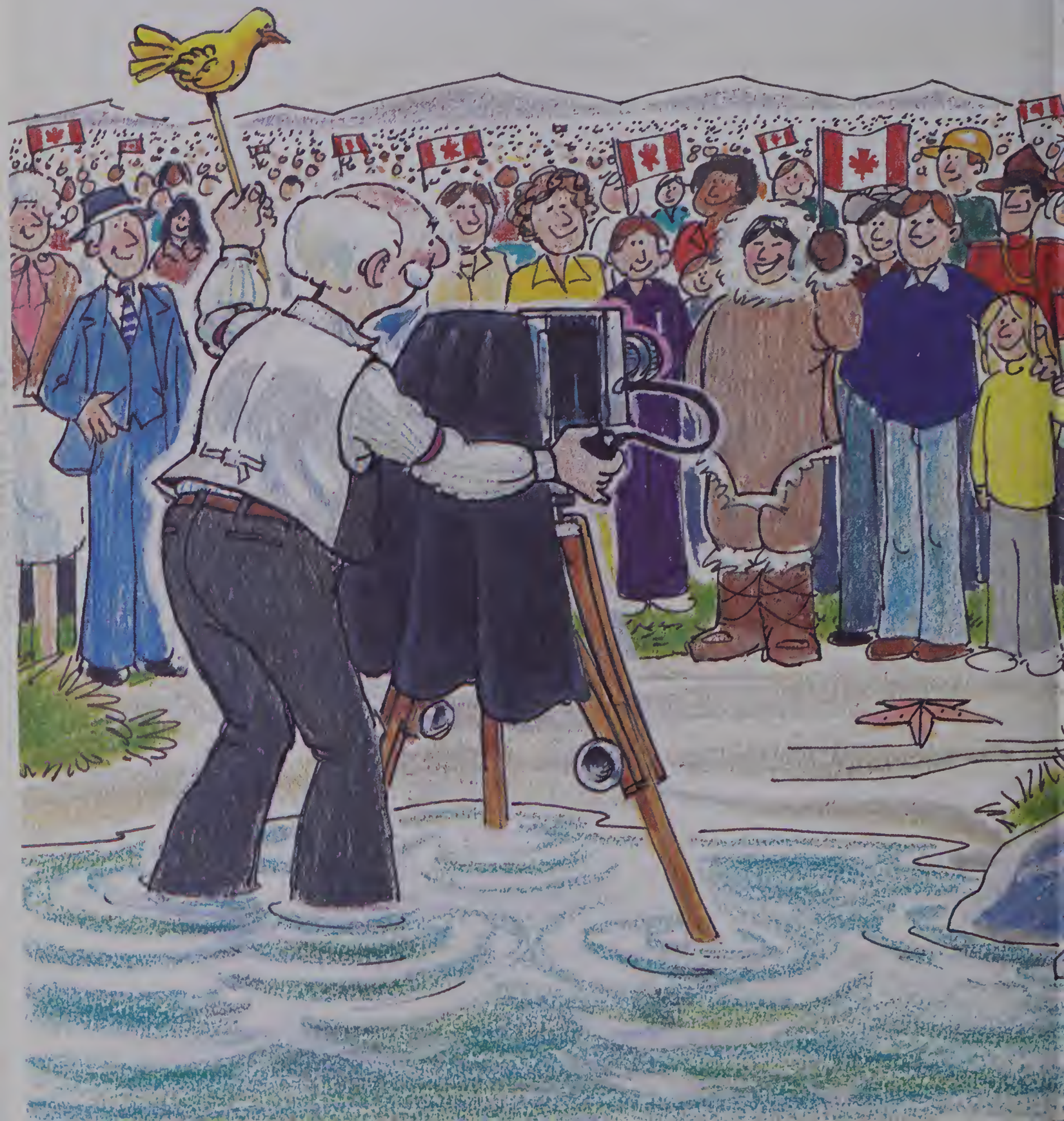
Calculate.

25. 7% of 600
26. 36% of 175
27. 65% of $420

Solve.

28. 5 bars of soap cost $1.95. How much will 7 cost?
29. Ann spelled 37 out of 50 words correctly on a test. What percent of the words did she spell correctly?

UNIT 11
APPLICATIONS



Growing Pains

Population of Canada

Year	Population
1851	2 436 297
1871	3 689 257
1891	4 833 239
1911	7 206 643
1931	10 376 786
1951	14 009 429
1961	18 238 247
1971	21 568 311
1976	22 992 604

Use rounded numbers and match questions and answers.

1. By how much did the population increase from 1851 to 1871?
2. The difference in population from 1851 to 1951 was about how much?
3. How much is half of the population figure for 1961?
4. Double the population figure for 1891 is how much?
5. If 2 million is added to the 1976 figure, what will the number be?
6. In 1951, Newfoundland was included for the first time. Without Newfoundland, the figure would have been 13 648 006. What was the population of Newfoundland?
7. The projected population of Canada in 2001 is 30 655 500. How much more is that than the population in 1976?
8. From 1951 to 1961, about 25% of the increase was due to immigration. About how many people was that?

Answers

a.	12 000 000
b.	46 000 000
c.	1 300 000
d.	25 000 000
e.	1 000 000
f.	9 600 000
g.	9 000 000
h.	8 000 000
i.	2 000 000
j.	400 000

Mode

Heights of Players on the Southdale Basketball Team

145 cm 148 cm 150 cm 150 cm 150 cm 155 cm 155 cm 160 cm

The shortest player is 145 cm tall.
The tallest player is 160 cm tall.

$$\begin{array}{r} 160 \\ -\ 145 \\ \hline 15 \end{array}$$

The **range** is 15 cm.

Three of the players are 150 cm tall.
The number that occurs most often is called the **mode**.
The **mode** of the data is 150 cm.

How often do the other heights occur?

EXERCISES

What is the range of the set of numbers? What is the mode?

1. 12, 13, 15, 15, 18
   Range: 18 − 12 = ■
   Mode: ■

2. 88, 92, 95, 95, 95
   Range: 95 − 88 = ■
   Mode: ■

3. 10 cm, 10 cm, 12 cm, 14 cm, 15 cm, 16 cm
   Range: ■ Mode: ■

4. 22°C, 25°C, 25°C, 25°C, 26°C, 28°C, 29°C
   Range: ■ Mode: ■

5. 30 L, 27 L, 30 L, 29 L, 30 L
   Range: ■ Mode: ■

6. 120 kg, 131 kg, 131 kg, 167 kg
   Range: ■ Mode: ■

7. 82 s, 80 s, 76 s, 75 s, 84 s, 97 s, 75 s
   Range: ■ Mode: ■

8. 50 m, 55 m, 45 m, 50 m, 40 m, 50 m
   Range: ■ Mode: ■

PRACTICE

What are the range and mode?

1. Heights of Students (cm)

142	139	178	164	167
155	146	150	161	158
173	156	169	149	153
144	170	155	154	157
160	152	165	155	146

2. Daily High Temperatures in May (°C)

14	10	13	16	18	19	21	20
18	12	9	12	16	18	23	19
10	11	12	15	14	20	22	23
20	15	14	17	17	19	20	

The mode isn't always a number.
What is the mode for each set of data?

3. Range of Marks Students

A	75-100	2
B	66-74	15
C	60-65	14
D	50-59	5
E	less than 50	3

4. Shirts Ordered by Size in One Week

Size	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	TOTAL
S	2	0	3	8	10	12	
M	3	2	5	7	15	23	
L	2	2	4	5	12	16	
XL	1	2	0	4	9	13	

Family Studies

Southdale's Grade 6 class conducted a survey on the size of students' families.

Number of children	1	2	3	4	5	6	7
Families	4	7	10	5	2	0	1

1. How many families have 2 children? 7 children?
2. What is the range for the numbers of children? the mode?
3. How many families have fewer children than the mode?
4. How many children are there altogether in all the families?
5. Can you show how to use a calculator with a memory to solve question 4?

Mean

The chart gives the daily attendance for the first week of May at Beauport School. What was the **mean** daily attendance?

Attendance Month: May	Week: 1
Monday	418
Tuesday	422
Wednesday	417
Thursday	425
Friday	413

The **mean** for a set of data is found by dividing the sum by the total number of items.

$$\begin{array}{r} 418 \\ 422 \\ 417 \\ 425 \\ +413 \\ \hline 2095 \end{array} \qquad 5\overline{)2095} \quad 419$$

The mean daily attendance for the week was 419.
The *mean* is what people often call the **average**.
Mean and mode are two types of averages.

EXERCISES

Find the mean.

1. 8, 9, 7, 10, 6

■ ÷ 5 = ■

2. 70, 75, 90, 85

■ ÷ 4 = ■

3. 130, 125, 126, 120, 121, 122

■ ÷ 6 = ■

4. 40, 47, 42, 45, 46

5. 120, 128, 130

Find the mean. Round to the nearest whole number.

6. 32 cm, 41 cm, 37 cm

7. 80 kg, 73 kg, 63 kg, 86 kg, 76 kg

8. 1047 L, 1212 L, 1153 L, 1181 L

9. 18.5 s, 19.8 s, 20.2 s, 19.0 s, 19.5 s

PRACTICE

Find the mean and the range.

1. 20 cm, 18 cm, 17 cm, 10 cm, 23 cm, 17 cm
2. 41 kg, 49 kg, 53 kg, 51 kg, 44 kg, 52 kg
3. 32 m^2, 60 m^2, 48 m^2, 35 m^2, 56 m^2, 29 m^2, 51 m^2
4. 70 L, 39 L, 62 L, 45 L
5. 134 km, 205 km, 126 km, 215 km, 163 km

Find the mean. How many numbers are greater than the mean? How many numbers are less than the mean?

6. 10°C, 11°C, 14°C, 12°C, 13°C
7. 62 mm, 60 mm, 60 mm, 65 mm, 63 mm, 68 mm
8. 110 t, 115 t, 105 t, 102 t
9. 46 min, 52 min, 63 min, 45 min, 58 min, 60 min

Find the mean. Round to the nearest tenth.

10. 1.8 km, 1.2 km, 2.1 km, 1.9 km, 1.8 km
11. 3.4 s, 3.6 s, 4.1 s, 4.5 s, 3.7 s, 4.4 s

Solve.

12. Eric's marks on 5 tests were 70, 75, 80, 72, and 73. What was the mean score, the range, and the total score for the 5 tests?
13. Danielle had a mean score of 79 on 5 tests. Her first 4 test scores were 75, 79, 85 and 80.
    What did she score on her last test?

A Mean Age

Diter is 11 years 2 months old. His friends Debbie and Ralph are 10 years 11 months and 11 years 8 months old. What is their mean age? Try to find a short cut for solving this problem.

The Median

Miss Lindstrom gave a surprise test. The marks were 60, 78, 75, 90, 42, 60, 95, 85, and 70.

Write the marks in order, from smallest to largest.

42 60 60 70 <u>75</u> 78 85 90 95

The *middle number* (the 5th number) is 75.
The middle number is called the **median**.

> If there are two middle numbers, the median is the number halfway between them.

42 60 60 70 <u>75</u> <u>77</u> 78 85 90 95

The median is 76.

EXERCISES

Find the median.

1. 3, 4, 7, 9, 10
2. 4, 5, 8, 10, 11, 12, 15
3. 10, 12, 15, 16, 18, 20, 22
4. 30, 32, 36, 38, 39, 43
5. 72 cm, 73 cm, 77 cm, 81 cm
6. 116 g, 119 g, 120 g, 130 g, 137 g, 142 g

Write the numbers in order and then find the median.

7. 175, 163, 179
8. 49, 31, 35, 44, 37, 42, 39
9. 9, 16, 11, 8, 22
10. 51, 50, 56, 53
11. $86, $80, $89, $90, $78, $63, $90, $75, $10, $88, $89, $80
12. 3 kg, 4 kg, 9 kg, 2 kg, 2 kg, 7 kg, 1 kg, 10 kg, 2 kg, 9 kg

PRACTICE

Find the median.

1. 82, 95, 78, 91, 86
2. 65, 58, 61, 72, 57, 70
3. 14, 18, 23, 16, 36, 14, 18, 12, 16, 23, 14, 20, 19, 12
4. 42°C, 12°C, 30°C, 34°C, 20°C, 19°C
5. $19, $8, $9, $24, $22, $10, $20, $20, $18, $19, $19, $16, $20
6. 26 m, 16 m, 9 m, 8 m, 12 m, 17 m, 20 m, 27 m, 8 m
7. 57 kg, 70 kg, 61 kg, 60 kg, 63 kg, 61 kg

Find the median and the mean to the nearest tenth.

8. 6, 12, 9, 7, 6
9. 13, 6, 12, 5
10. 22 cm, 25 cm, 30 cm, 21 cm, 37 cm, 27 cm, 30 cm, 23 cm, 20 cm
11. 9.61 g, 8.99 g, 8.43 g, 7.87 g, 8.05 g

Solve.

12. Ten students measured the lengths of their right hands. The results were: 18 cm, 20 cm, 17 cm, 23 cm, 20 cm, 20 cm, 21 cm, 20 cm, 19 cm, and 18 cm. Find the mode, the mean, the median, and the range of the measures.

13. What information would help you to decide whether it is safe to cross a stream? the mean depth, the range, the median depth, or the mode? (Assume you can't swim.)

14. Try to find seven numbers so that:
    a. mean < median < mode
    b. median < mean < mode
    c. mean < mode < median
    d. mode < median < mean

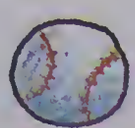
Batting Averages

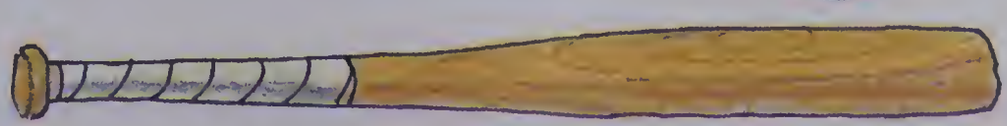
If a baseball player gets 38 hits in 109 times at bat, his or her batting average is

$\frac{38}{109} = 0.349$ (to the nearest thousandth).

Use a calculator to find who has the best batting average.

	Times at Bat	Hits
Jill Wahl	98	32
Linda Lipka	112	39
Sharon Nolan	116	40





Bar Graphs

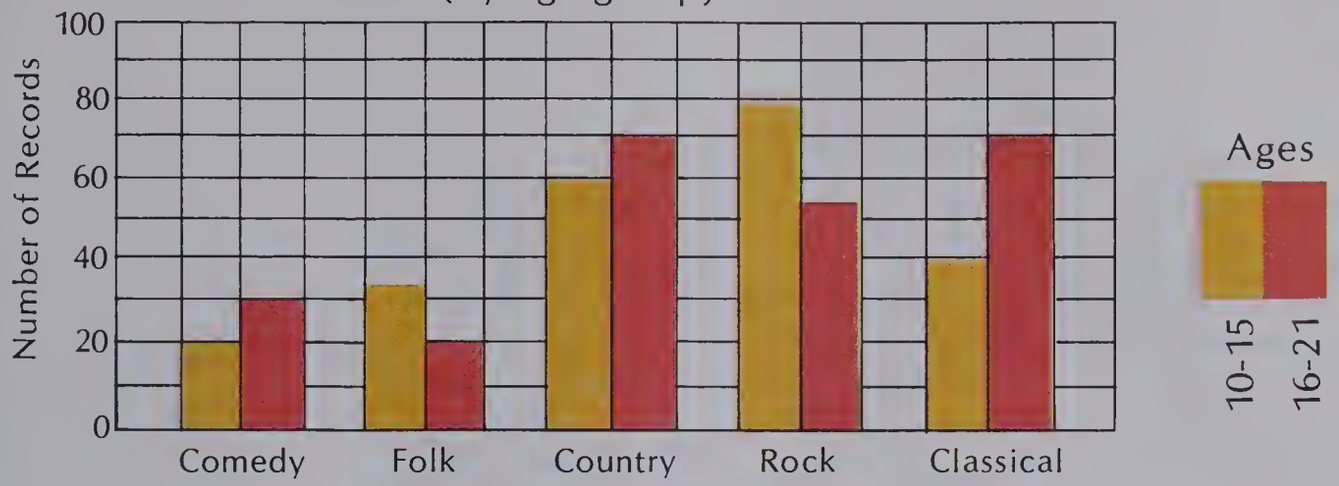
EXERCISES

Use the graph to answer the questions.

1. What information is provided by the graph?
2. How is the data for 1976 shown? for 1982?
3. How many people played golf in 1976? in 1982?
4. How many people bicycled in 1976? in 1982?
5. How many people swam in 1976? in 1982?
6. What was the most popular fitness activity in 1976? in 1982?
7. Which two sports had the greatest increase in participation?
8. Did any activity have a decrease in participation?

PRACTICE

Records Bought at Sam's Record Store During Month of June
(by age group)



1. What information is provided by the graph?
2. How is the number of records bought by each group shown?
3. How many comedy records were bought by each group?
4. How many country records were bought by each group?
5. Which type of record was least popular with the older group?
6. Which type was most popular with the younger group?
7. Which types did both groups like about the same?

8. When they were seven years old, Martin and Teresa were both 125 cm tall. When they were nine, Martin was 130 cm and Teresa was 140 cm. When they were eleven, Martin was 150 cm and Teresa was 145 cm. Make a graph to show this.

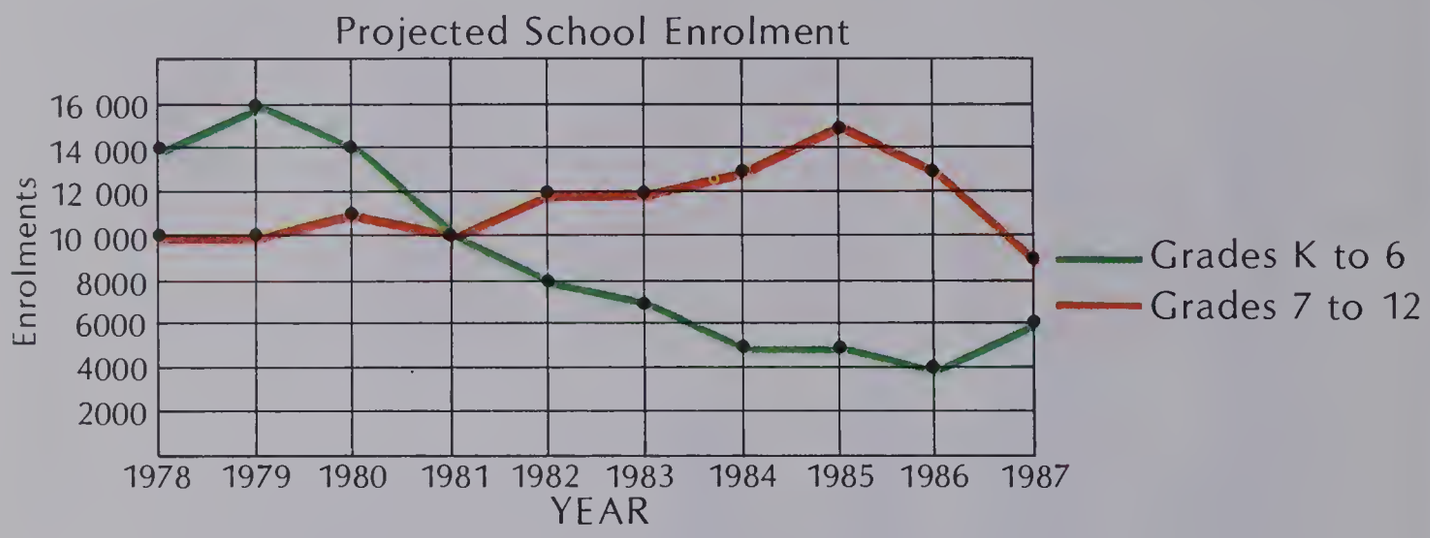
Budget Time

Paul and Petra each get a weekly allowance of $7.00. One week, Paul spent his as follows: bus fare $1.00, school supplies $0.50, snacks $2.30, tickets for entertainment $2.50, savings $0.70. Petra spent hers like this: bus fare $1.80, school supplies $2.40, snacks $1.60, tickets for entertainment $0, savings $1.20.

Make a graph to show how Paul and Petra spent their allowances.

Line Graphs

A school superintendent made a graph of the projected enrolment in her district's schools. She joined the dots on the graph with line segments to help show the trends.



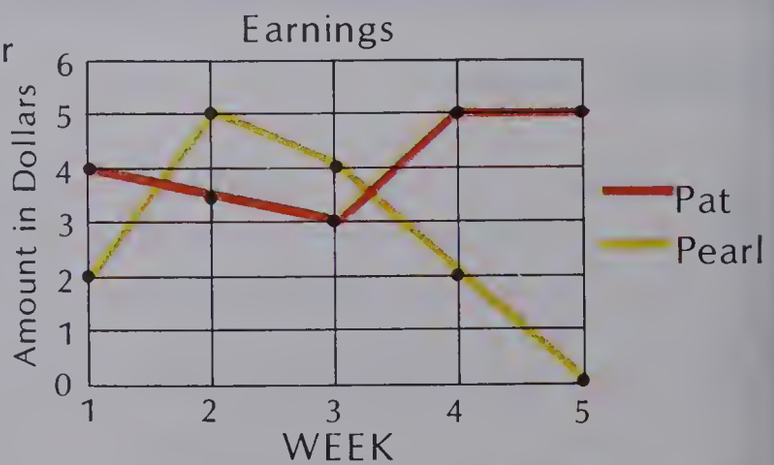
EXERCISES

Use the graph to answer the questions.

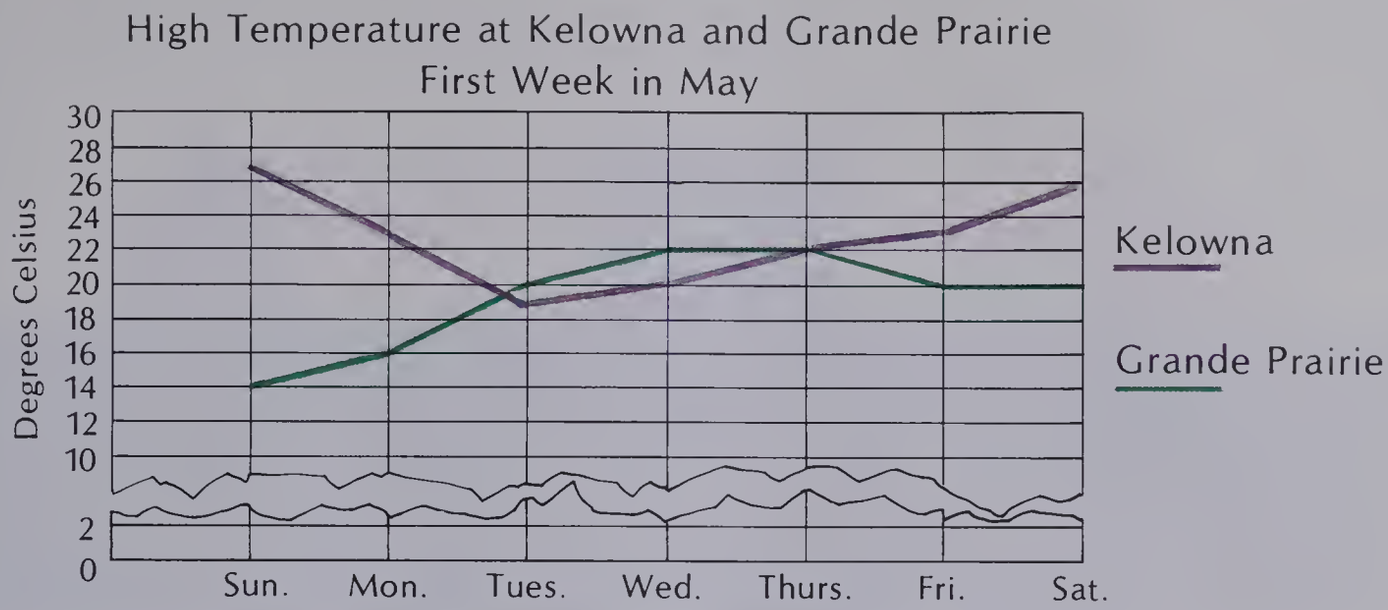
1. What does the red line indicate?
   What does the green line indicate?
2. What was the enrolment in Grades K to 6 in 1979? in 1980?
3. What was the enrolment in Grades 7 to 12 in 1980?
4. What is the projected enrolment in Grades K to 6 in 1987?
5. When does the enrolment in Grades 7 to 12 peak?
6. What has been happening to the enrolment in Grades K to 6?

Pat and Pearl kept a graph of their earnings from baby sitting.

7. How are Pearl's earnings indicated? Pat's?
8. How much did Pat earn in week 2? in week 4?
9. What week did Pearl not earn anything?



PRACTICE



1. What information does the graph show?
2. Give the temperatures for Kelowna and Grande Prairie on Sunday.
3. When was the temperature the lowest for Kelowna?
4. When was the temperature for Kelowna and Grande Prairie the same?
5. Which city had its higher temperatures in the middle of the week?

REVIEW

A58 What are the range and mode?

1. 20, 13, 20, 23, 27
2. 37, 52, 52, 46, 37, 41, 52

A59 Find the mean. Round to the nearest whole number.

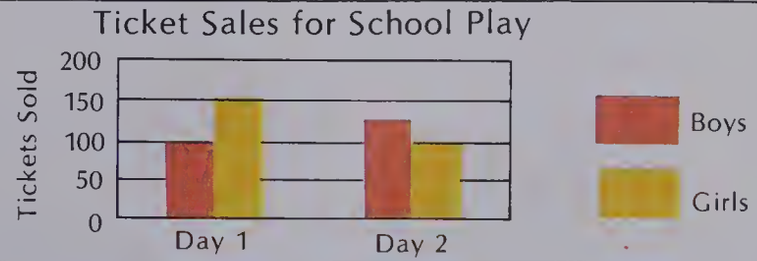
3. 70, 39, 62, 45
4. 305, 315, 234, 226, 263

A60 Find the median.

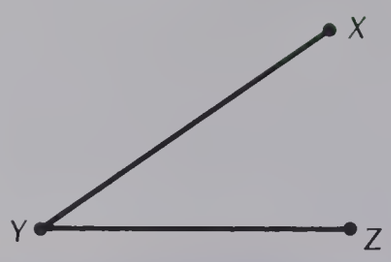
5. 28, 17, 14, 19, 17, 16, 18
6. 18, 16, 21, 19

GR1

7. How many tickets did the boys sell on Day 1?
8. Who sold more tickets on Day 2?



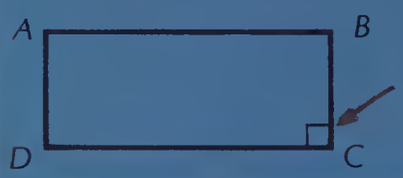
Angles



Line segments *YX* and *YZ* meet at point *Y* and form an **angle** at *Y*.

It is called angle *XYZ* or just angle **Y**.
Point *Y* is called the **vertex** of the angle.

A **right angle** is formed at the corner (or vertex) of a square or rectangle.



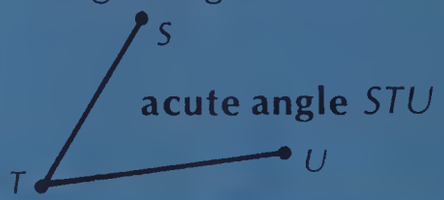
right angle *BCD*

EFG is called a **straight angle** because *EG* is a straight line.

Lines or segments that meet at right angles are said to be **perpendicular**.

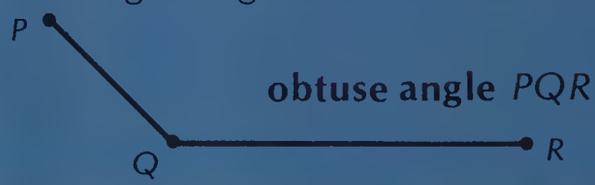
PQ is perpendicular to *RS*.

An **acute angle** is smaller than a right angle.



acute angle *STU*

An **obtuse angle** is larger than a right angle.

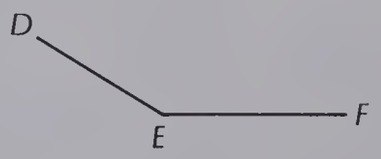


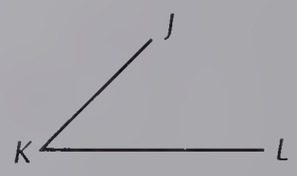
obtuse angle *PQR*

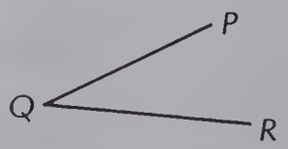
EXERCISES

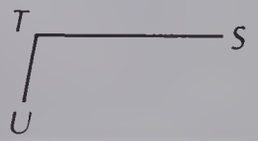
Is the angle *acute*, *obtuse*, *right*, or *straight*?
Name the angle using the letters shown.

1.

2. 

3. 

4. 

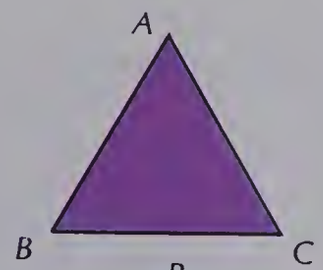
5. 

6.

PRACTICE

Name all the angles in each figure.
Label each as *obtuse, acute, right,* or *straight.*

1.



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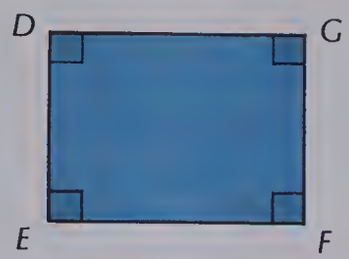

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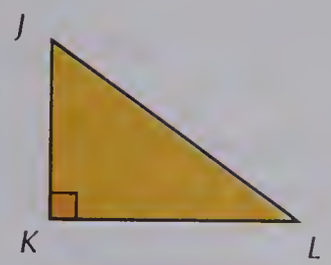
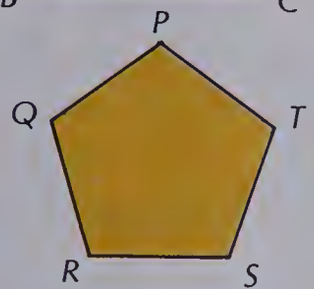


4.



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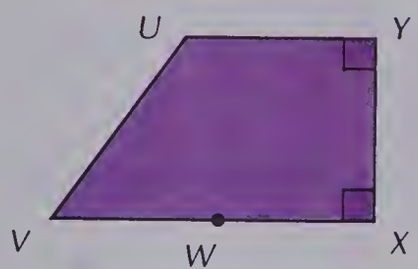
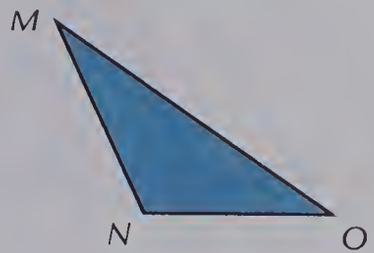
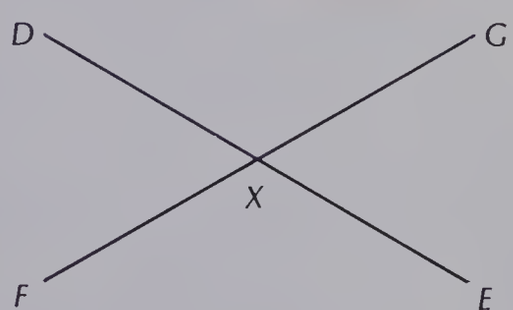


6.



7. List all the angles formed when these two lines **intersect**.
Describe each angle as obtuse or acute.



8. Trace the figure on the right. Turn the tracing about point *X* so that *D* is over *E* and *F* is over *G*.
What do you notice?

Clock Angles

03:00
right angle

06:00
straight angle

07:30
acute angle

07:00
obtuse angle

Name the angles formed by the clock hands at each time.

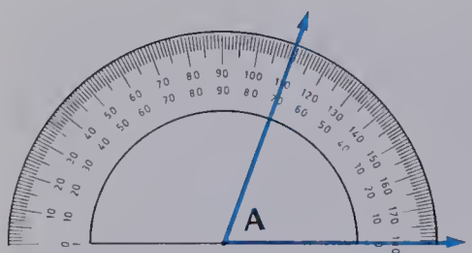
1. 09:00 **2.** 02:00 **3.** 11:30 **4.** 08:15 **5.** 10:45

6. How many straight angles are formed during a twelve-hour period?

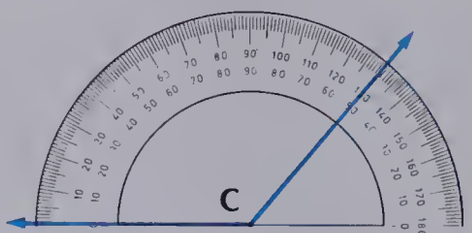
Measuring Angles

The unit for measuring angles is the **degree**. An angle of one degree (1°) would look like this.

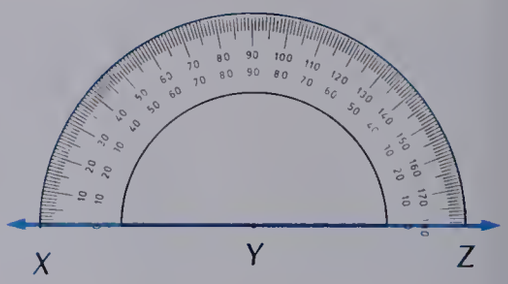
A **protractor** is used to measure the size of an angle in degrees.



Angle **A** is 70°.



Angle **C** is 130°.

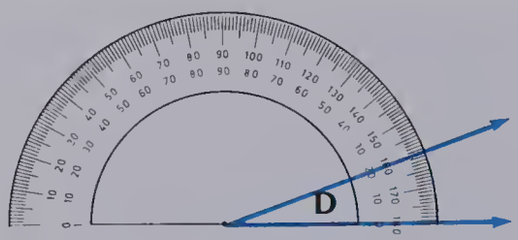


Angle *XYZ* is 180°.

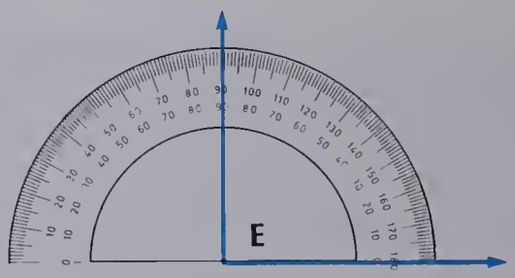
EXERCISES

What is the size of the angle?

1.

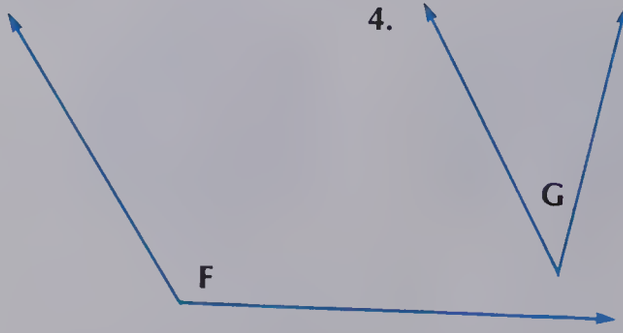


2.



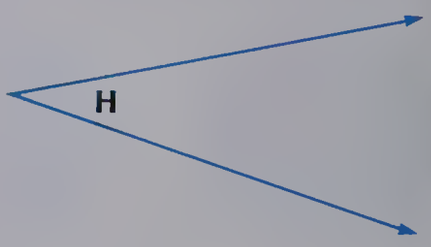
Use a protractor to measure the angle.

3.



4.

5.

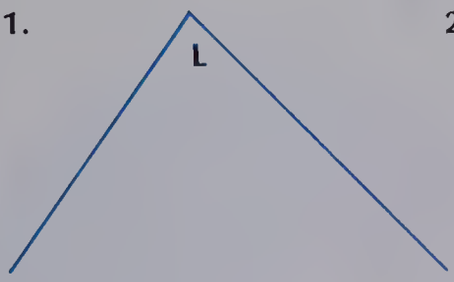


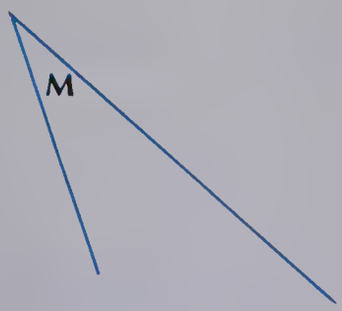
6.

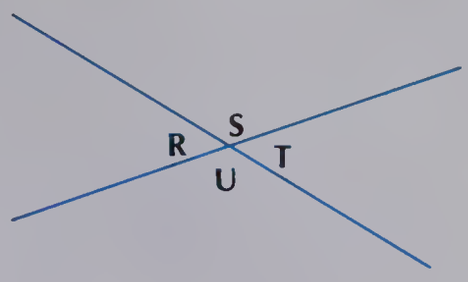
7. What is the size of a right angle?
8. Describe an acute angle using degree measures.
9. What is the size of a straight angle?
10. Describe an obtuse angle using degree measures.

PRACTICE

Measure the angles.

1. 

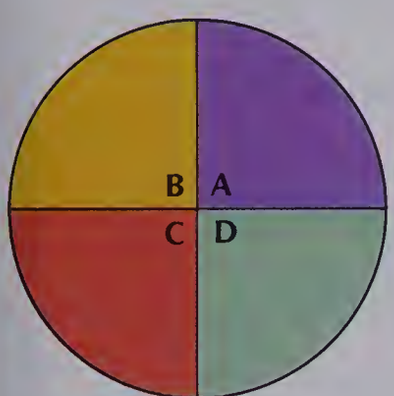
2. 

3. 

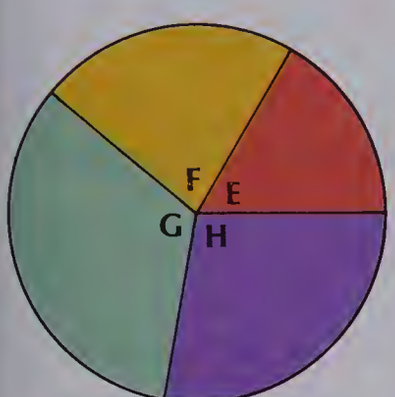
Construct an angle of the given size. Use a protractor.

4.	40°	5.	25°	6.	90°	7.	80°	8.	110°
9.	135°	10.	160°	11.	180°	12.	77°	13.	48°

Circles Know All the Angles!

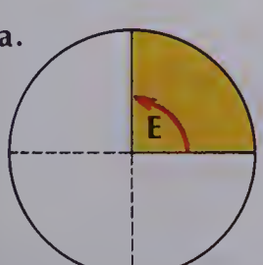


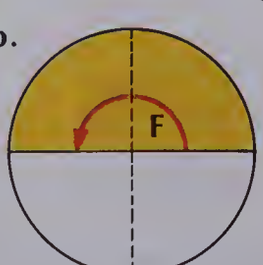
1. Measure the angle.
   Angle **A** is ■.
   Angle **B** is ■.
   Angle **C** is ■.
   Angle **D** is ■.
   The sum of the angles at the centre of the circle is ■.

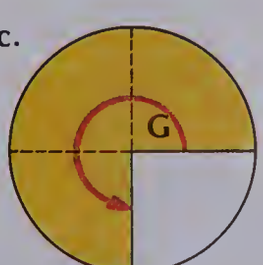


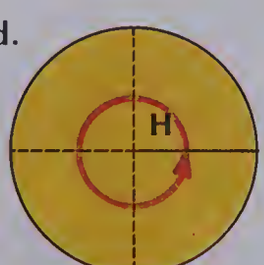
2. Measure the angle.
   Angle **E** is ■.
   Angle **F** is ■.
   Angle **G** is ■.
   Angle **H** is ■.
   The sum of the angles at the centre of the circle is ■.

3. What is the measure of each angle?

a. 

b. 

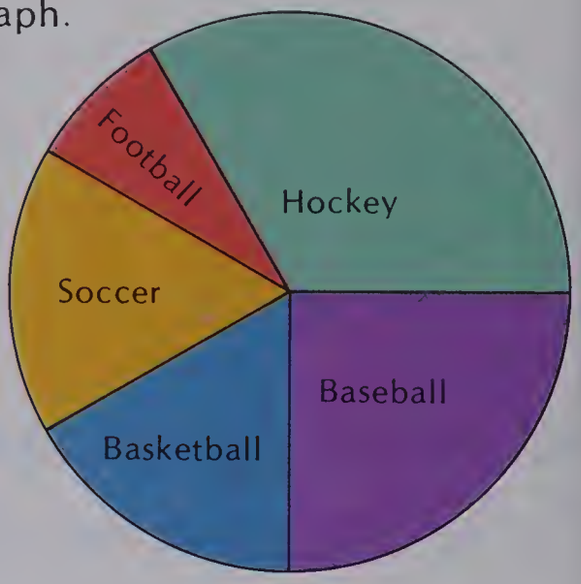
c. 

d. 

Circle Graphs

Frank asked 36 people, "What is your favourite sport?"
Then he made a table of values and a circle graph.

Sport	Number of Votes	Fraction of Total	Size of Angle
Hockey	12	$\frac{1}{3}$	120°
Baseball	9	$\frac{1}{4}$	90°
Basketball	6	$\frac{1}{6}$	60°
Soccer	6	$\frac{1}{6}$	60°
Football	3	$\frac{1}{12}$	30°
TOTAL	36		360°



Find the fraction by dividing the number of votes by the number of people.

$\frac{12}{36} = \frac{1}{3}$ $\frac{9}{36} = \frac{1}{4}$ $\frac{6}{36} = \frac{1}{6}$ $\frac{3}{36} = \frac{1}{12}$

There are 360° in a full turn. Frank found the size of each angle by multiplying 360 by the fraction.

EXERCISES

Copy and complete the table.

1.

Favourite Colour	Number of Votes	Fraction of Total	Size of Angle
Red	8	$\frac{1}{3}$	120°
Blue	6		
Orange	6		
Yellow	4		
TOTAL			

2. Which circle graph illustrates table 1?

A.

B.

C.

D.

PRACTICE

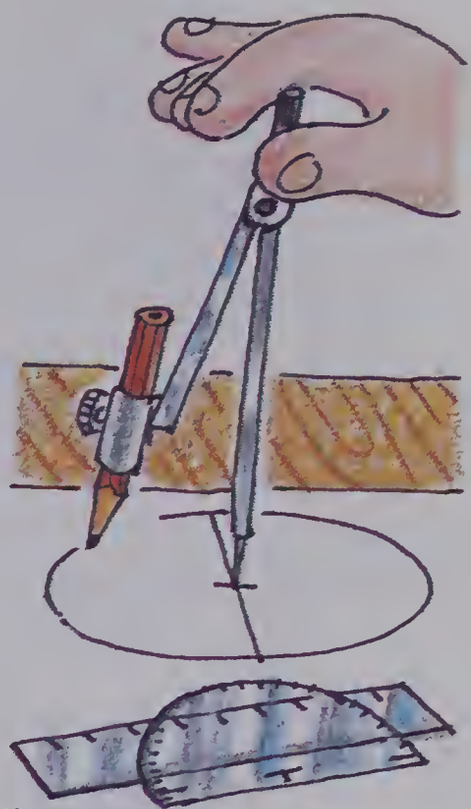
Copy and complete the table.
Construct a circle graph to show the information.

1.

Lunch Hour Activity	Time in Minutes	Fraction of Time	Size of Angle
Eat	30	$\frac{1}{2}$	180°
Read	20		
Talk	10		
TOTAL			360°

2.

Daily Activity	Number of Hours	Fraction of Day	Size of Angle
Sleeping	8	$\frac{1}{3}$	120°
Eating	3		
School	6		
Play	4		
Homework	3		
TOTAL			360°



3. Crude oil is made into several different fuel oils.
A typical yield from 48 L of crude oil would be

Gasoline — 8 L Diesel — 12 L
Kerosene — 8 L Heating oil — 16 L Other — 4 L

Make a circle graph to show this information.

A Pizza Puzzle

A medium pizza from Bitondo's has a radius of 20 cm.
If the pizza is cut into 10 equal pieces, what is the angle formed by each piece?

$$\frac{1}{10} \times 360° = 36°$$

What is the area of one piece?

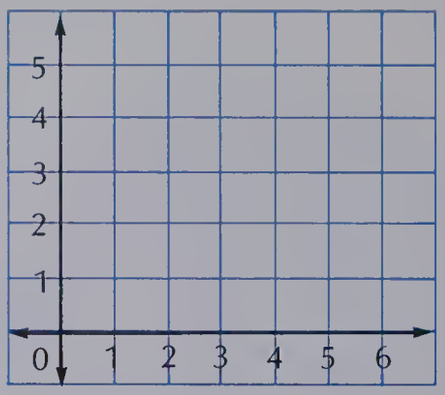
$\frac{36}{360} \times \pi R^2$ (Use $\pi = 3.14$.)

Copy and complete the chart.

Number of Equal Pieces	Angle	Area of One Piece
10	36°	
6		
12		
	90°	
		628 cm²

Ordered Pairs

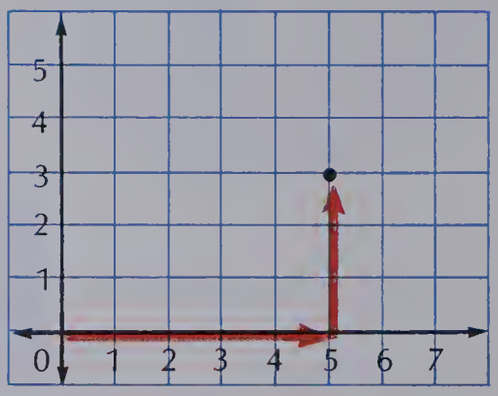
Each **axis** of the grid is a number line. The two **axes** are perpendicular.



The point where the number lines intersect is called the **origin**.

To locate the point for the ordered pair (5, 3):

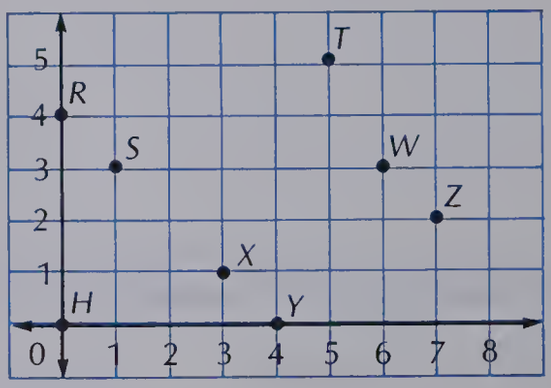
1. Start at the origin.
2. Move 5 units to the right
3. and then 3 units up.



EXERCISES

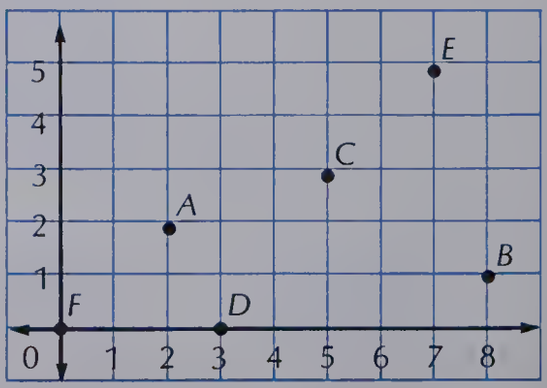
Write the letter name for the ordered pair.

1. (3, 1)
2. (1, 3)
3. (7, 2)
4. (0, 4)
5. (5, 5)
6. (6, 3)
7. (0, 0)
8. (4, 0)



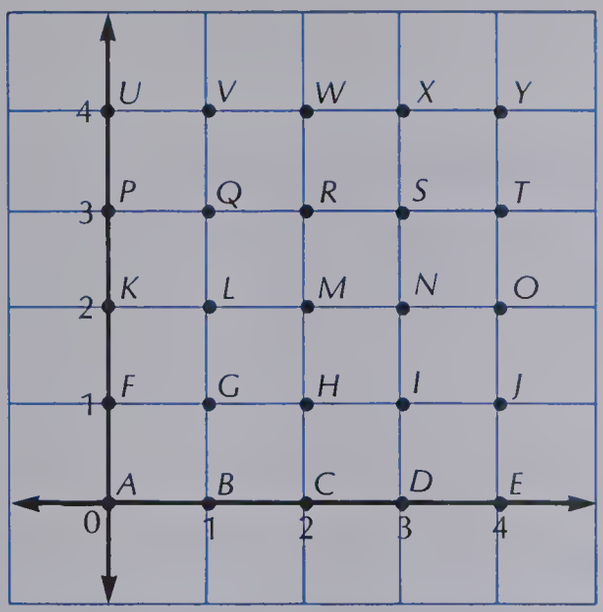
Write the ordered pair for each point.

9. *A*
10. *B*
11. *C*
12. *D*
13. *E*
14. *F*



PRACTICE

1. Use the grid to decode the message.



(4, 4) (4, 2) (0, 4) (1, 1) (4, 2) (4, 3)
(2, 3) (3, 1) (1, 1) (2, 1) (4, 3) (4, 3) (4, 2)
(4, 3) (2, 1) (4, 0) (0, 3) (4, 2) (3, 1) (3, 2) (4, 3)

Use the same grid. Write the ordered pairs that spell each word.

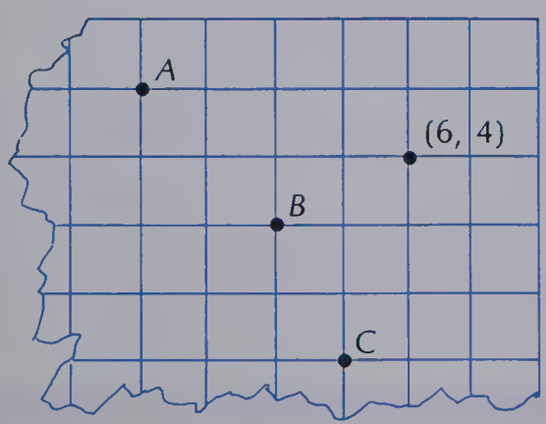
2. FIRST
3. MATH
4. BREAK

5. What is the ordered pair for the origin?

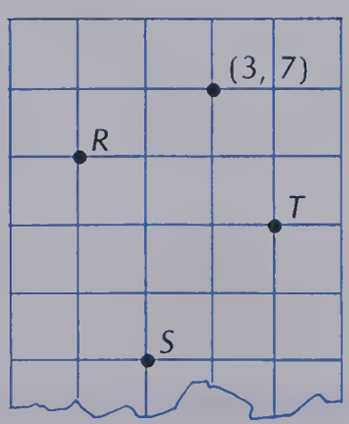
No Axes to Guide

The axes and some of the grid have been torn away.
What are the coordinates of the lettered points?

1.



2.



Problem Solving

Using Smaller Numbers

Together John and Len have $115.
John has four times as much money as Len.
How much does each boy have?

This problem seems simpler if you start with smaller numbers.
Suppose Len has $1. Then John has $4. That makes $5 in all.
It is clear that Len has $\frac{1}{5}$ of the money, and John has $\frac{4}{5}$.

So Len has $\frac{1}{5} \times \$115 = \$23$.

John has the rest: $\$115 - \$23 = \$92$ or $\frac{4}{5} \times \$115 = \$92$.

Restate the Problem: Break It into Simpler Parts

Last year, Cedar Golf Club charged a $600 membership fee and $10 for each game of golf. This year a membership costs $650 and the golfing fee is $6. How many times must you golf to make the new rates better?

Answer a series of simpler problems by using a chart.

	Member-ship fee	+ 1 Golf fee	+ 2 Golf fees	+ 3 Golf fees	+ 12 Golf fees	+ 13 Golf fees
Last year	600	610	620	630	720	730
This year	650	656	662	668	722	728

You must golf at least 13 times to make the new rates better.

EXERCISES

Solve.

1. Mary and Jean have $132 together.
Mary has half as much as Jean.
How much does each girl have?

2. There are 4 roads from Aston to Bart, 3 from Bart to Couts, 2 from Couts to Dole, and 5 from Dole to Endlane.
How many ways are there of travelling from Aston to Endlane?

PRACTICE

Solve.

1. The membership fee in a tennis club was raised from \$300 to \$375. The cost per game was reduced from \$8 to \$5. After how many games are the new rates better?

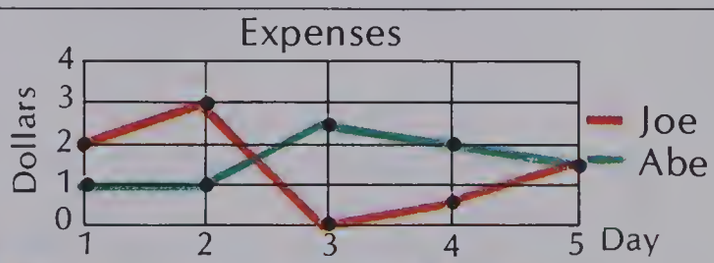
2. Three boxes hold 105 model cars. Box B stores double that of box A and half that of box C. How many cars does each box store?

3. Franco likes to walk a different way to school each day. How many paths can he take that are 12 blocks long?

REVIEW

GR2

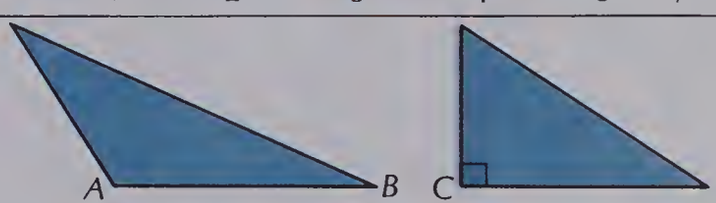
1. How much did Joe spend on Day 2? Day 3?
2. On which days did Abe spend more than Joe?



M14

Is the angle a right angle, acute angle, or obtuse angle?

3. *A* 4. *B* 5. *C*



M15

6. Construct an angle of 60°.
7. Construct an angle of 180°.

GR3

8. In an hour of free time, Jan talked on the phone for 10 min, roller skated for 30 min, and read for 20 min. Construct a circle graph to show how she spent the hour.

GR4

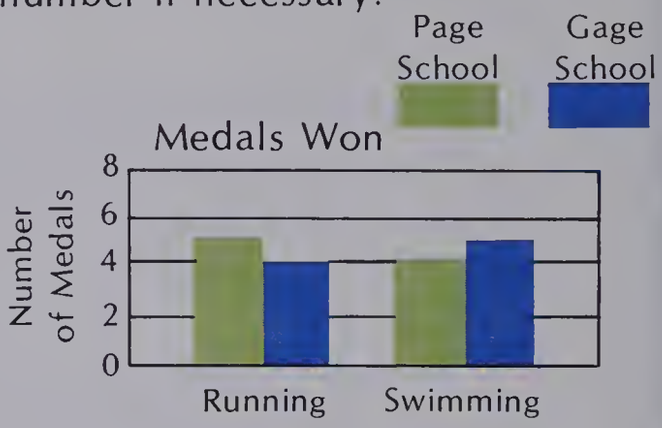
Construct a coordinate graph. Put these points on the graph.

9. P (3, 4)
10. Q (0, 2)
11. M (the origin)

TEST UNIT 11

What are the range, mode, mean, and median of each set of numbers? Round the mean to a whole number if necessary.

1. 19, 24, 18, 29, 22, 19, 21
2. 325, 325, 325, 300, 310
3. 56, 40, 47, 49, 52, 47



4. Which school won more medals for running?
5. How many swimming medals did Gage School win?

6. How many kilometres did Rod jog on Tuesday?
7. On what day did Rod jog the farthest?
8. Who had the steadiest jogging record?

Name the angle which is:

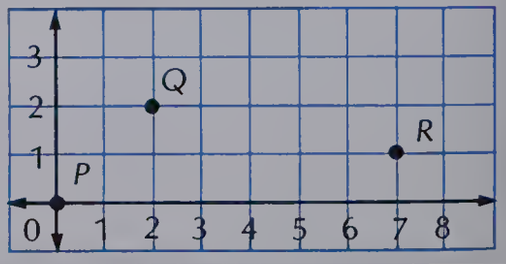
9. obtuse
10. straight

11. Which angle measures 15°?

12. Mrs. Kaslo planted 12 ha of corn, 8 ha of potatoes, 2 ha of peas, and 2 ha of strawberries. Construct a circle graph to show the areas planted.

Write the ordered pair for the point.

13. *P* 14. *Q* 15. *R*



LOOKING BACK

DIVISION

What is the reciprocal?

1. $\frac{1}{7}$
2. 9
3. $\frac{4}{11}$
4. $\frac{1}{5}$

Divide.

5. $\frac{4}{7} \div 3$
6. $\frac{1}{5} \div 3$
7. $\frac{2}{9} \div 2$
8. $\frac{1}{11} \div 3$
9. $6 \div \frac{1}{2}$
10. $\frac{1}{5} \div \frac{1}{3}$
11. $\frac{3}{8} \div \frac{1}{6}$
12. $10 \div \frac{1}{4}$
13. $8 \div \frac{3}{4}$
14. $\frac{1}{2} \div \frac{2}{3}$
15. $\frac{5}{6} \div \frac{3}{8}$
16. $9 \div \frac{5}{6}$
17. $6\overline{)3.6}$
18. $7\overline{)9.94}$
19. $15\overline{)0.375}$
20. $0.3\overline{)21}$
21. $0.8\overline{)1.28}$
22. $1.6\overline{)0.208}$
23. $0.04\overline{)0.032}$
24. $0.05\overline{)3.75}$
25. $0.21\overline{)16.8}$

Divide. Round to the nearest hundredth.

26. $12\overline{)1}$
27. $0.3\overline{)1.42}$
28. $0.11\overline{)9.7}$

Write the fraction as a decimal.
Divide until the remainder is zero.

29. $\frac{5}{8}$
30. $\frac{4}{10}$
31. $\frac{15}{20}$
32. $\frac{18}{16}$

Solve.

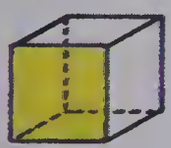
33. I am thinking of a number. If I divide it by 3 and then add 3, the result is 8. What is the original number?

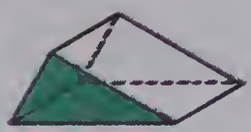
UNIT 12
GEOMETRY

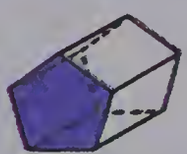
Solids

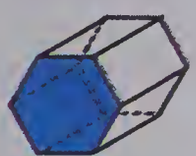
Name the coloured **face** of each solid.

1.

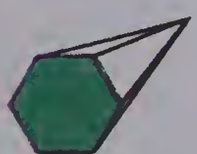
2. 

3. 

4. 

5. 

6.

7. 

8.

9.

10.

11.

12.

13. Match these names with the solids shown above.

a. cylinder	b. cone
c. cube	d. triangular prism
e. rectangular prism	f. pentagonal prism
g. hexagonal prism	h. triangular pyramid (tetrahedron)
i. square pyramid	j. pentagonal pyramid
k. hexagonal pyramid	l. octagonal pyramid

14. Make a chart for all the solids shown above.
Record the number of faces, edges, and vertices for each solid.

15. a. How many faces does a sphere have?
b. How many edges does it have?
c. How many vertices does it have?

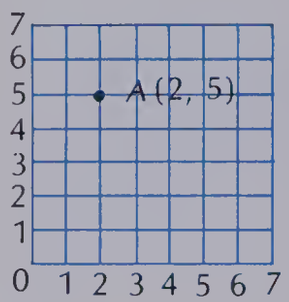
sphere

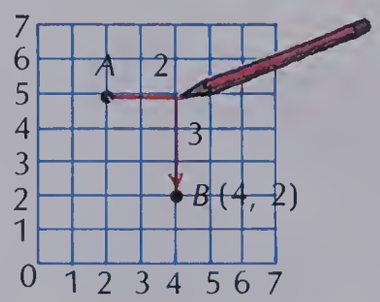
Slides

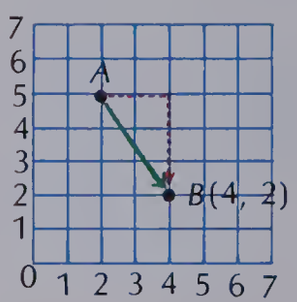
Marta is opening the patio door.

The motion of the door is called a **slide**.

Point *A* is at (2, 5) on the first grid.
When we *slide* **2** to the right and **3** down, we will be at point *B*, (4, 2).







The green arrow shows a single slide from *A* to *B* that we describe as 2 right, 3 down. Point *B* (4, 2) is called the **slide image** of point *A*.

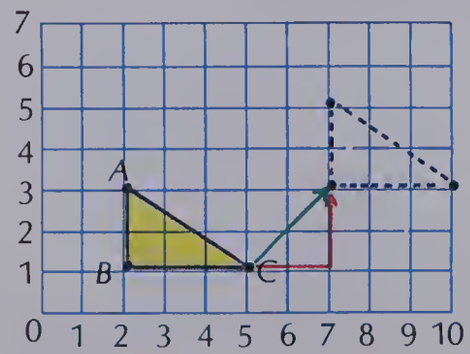
EXERCISES

What is the image of point *A* (2, 5) after each slide?

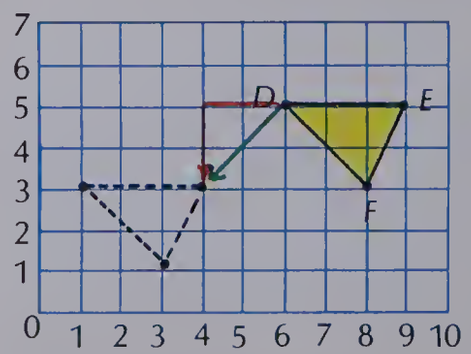
1. right **3**
2. right **3**, down **2**
3. right **4**, down **3**
4. right **4**, down **4**
5. left 1
6. left 1, down 1
7. left 1, up 1
8. right 3, up 2

Describe each slide. (For example, ■ left, ■ down.)
Name the ordered pair of the slide image for each vertex.

9.

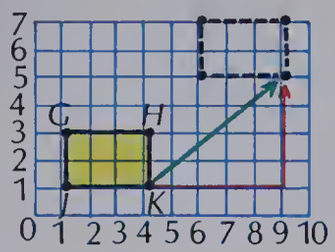


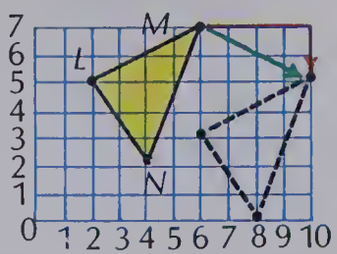
10.

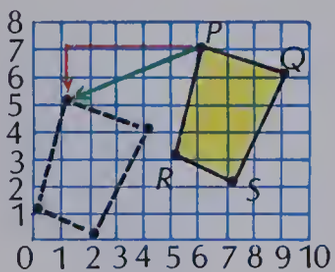


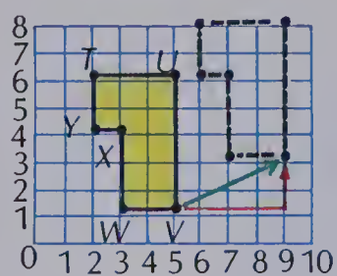
PRACTICE

Describe each slide.
Name the ordered pair of the slide image for each vertex.

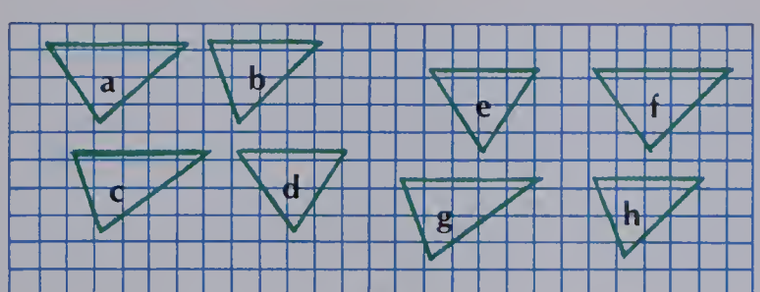
1. 

2. 

3. 

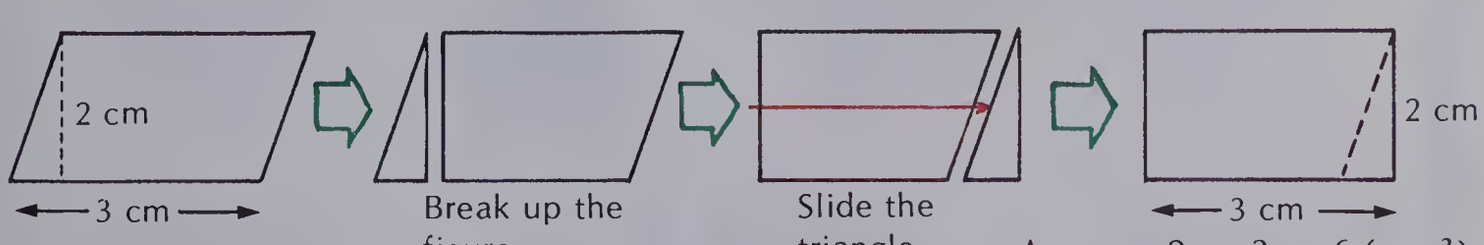
4. 

5. Trace triangle **a**. Find its slide image. Describe the slide.
Repeat for triangles **b**, **c**, and **d**.



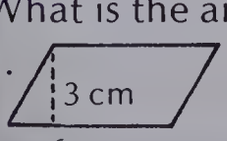
Parallelogram Areas

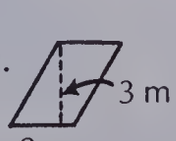
Study the picture to find the area of the figure.

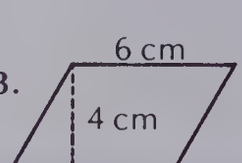


Area = $2 \times 3 = 6\ (cm^2)$

What is the area?

1. 

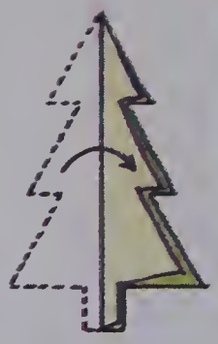
2. 

3. 

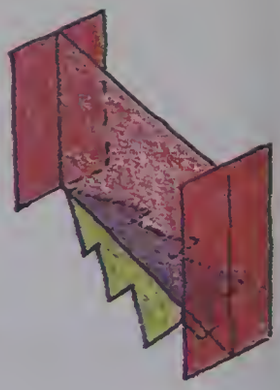
Symmetry

Trace the tree or use a *MIRA*.
Fold the tracing (or place the *MIRA*) along the dotted line.
If one part fits on the other, the picture has **line symmetry**.
The crease is called a **line of symmetry**.

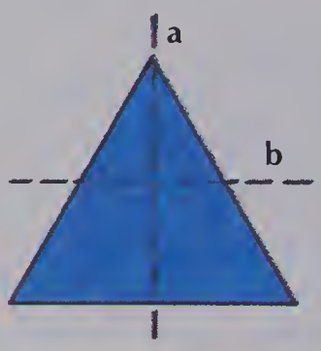
line of symmetry



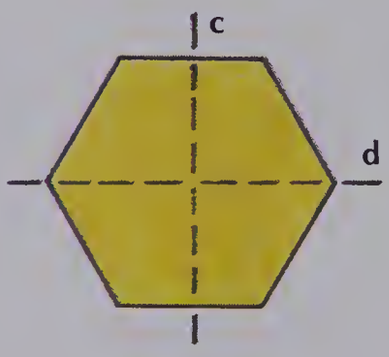
Two parts fit.



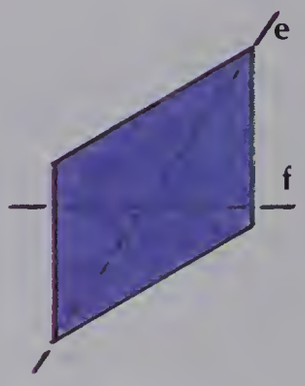
MIRA



Line **a** is a line of symmetry.
Line **b** is **not** a line of symmetry.



Lines **c** and **d** are both lines of symmetry.
This figure has other lines of symmetry.

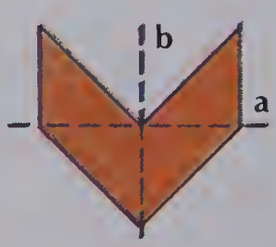


Neither line **e** nor **f** is a line of symmetry.

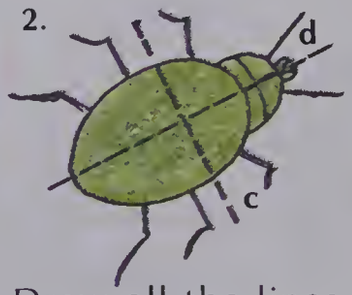
EXERCISES

Which line is a line of symmetry in each picture?

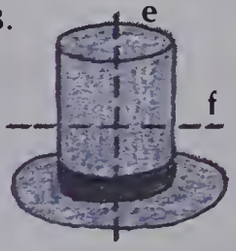
1.



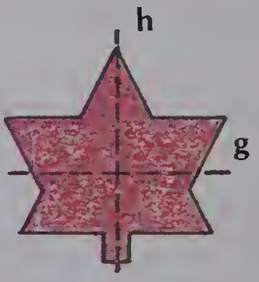
2.



3.



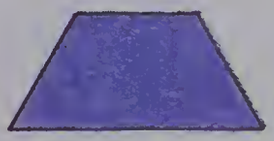
4.



Trace each figure. Draw all the lines of symmetry.

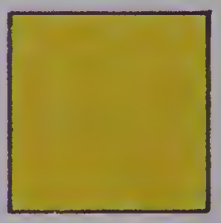
5.

6.



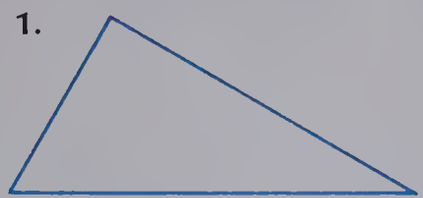
7.

8.



PRACTICE

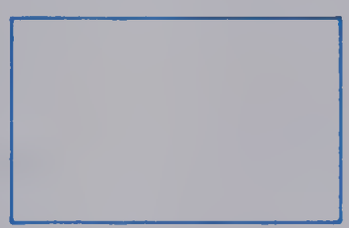
Use tracings or a *MIRA*.
Name each figure and tell how many lines of symmetry it has.

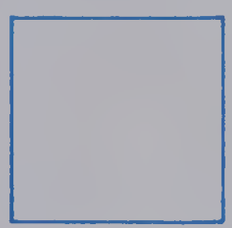
1. 

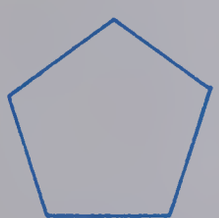
2.

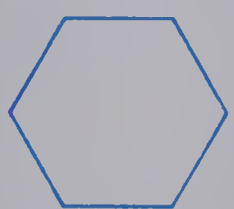
3.

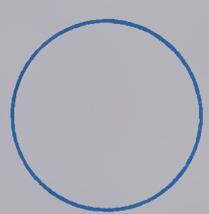
4.

5. 

6. 

7. 

8. 

9. 

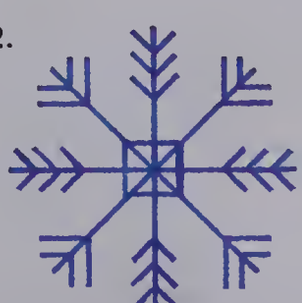
ABCDEFGHIJKLMNOPQRSTUVWXYZ

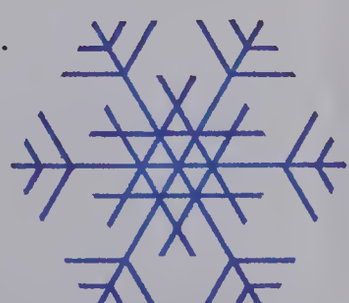
10. List the capital letters of the alphabet that have 1 line of symmetry.
11. List the capital letters of the alphabet that have 2 lines of symmetry.
12. Do any letters have more than two lines of symmetry?
13. Which vowels have at least one line of symmetry?

Snowflakes

How many lines of symmetry are there in each snowflake?

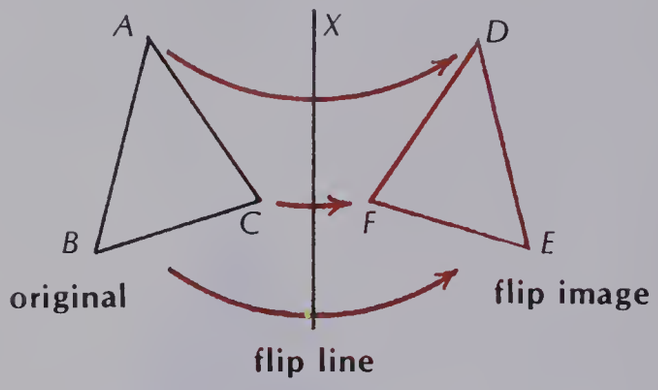
1.

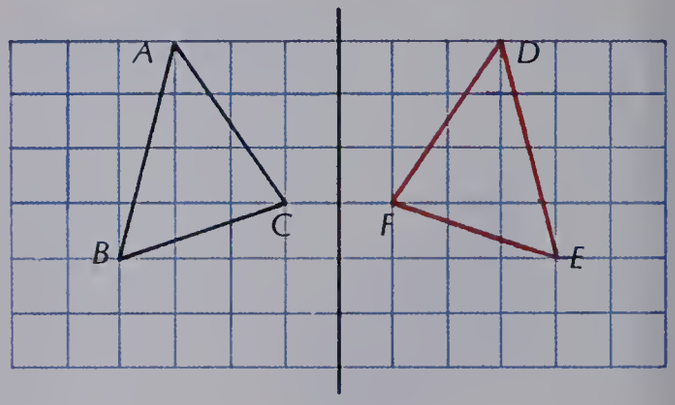
2. 

3. 

Flips

We can **flip** a triangle over a line.





Triangle *DEF* is the **flip image** of triangle *ABC*.

Point *D* is the image of *A*.
Point *E* is the image of *B*.
Point *F* is the image of *C*.

Using a grid, check the distance of each point from the flip line.

A and *D* are 3 units from the flip line.
B and *E* are 4 units from the flip line.
C and *F* are 1 unit from the flip line.

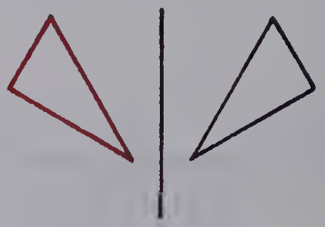
EXERCISES

Does the diagram suggest a flip?

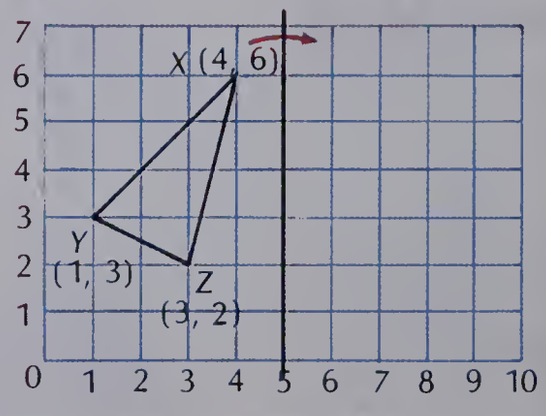
1.

2.

3.

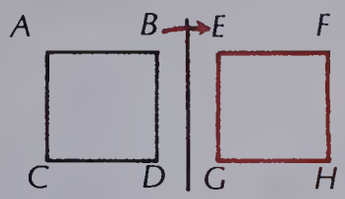
4. 

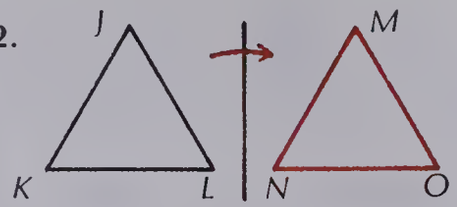
5. Name the ordered pairs for the vertices of the flip image of triangle *XYZ* over the black line.

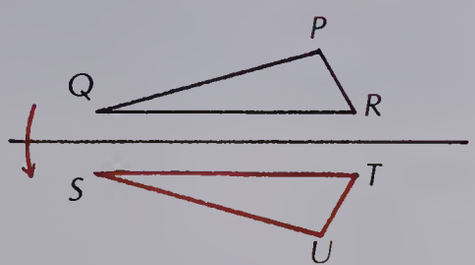


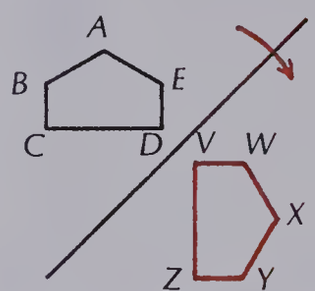
PRACTICE

Name the matching pairs of points for each object and its flip image.

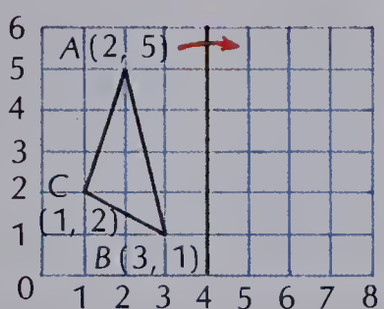
1. 

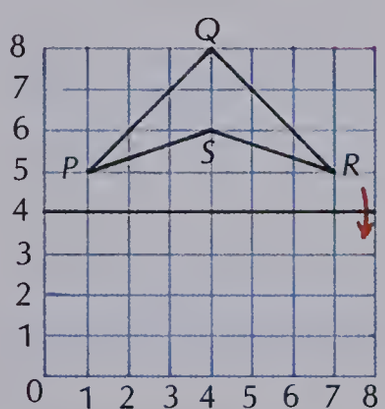
2. 

3. 

4. 

Name the ordered pair for each vertex of the flip image.

5. 

6. 

Palindromes and Flips

A palindrome is a word or phrase that is spelled the same backwards and forwards.

ANNA

PEEP

NEVER ODD OR EVEN

Some palindromes can be flipped and still look the same.

OTTO|OTTO AVA|AVA MOM|MOM

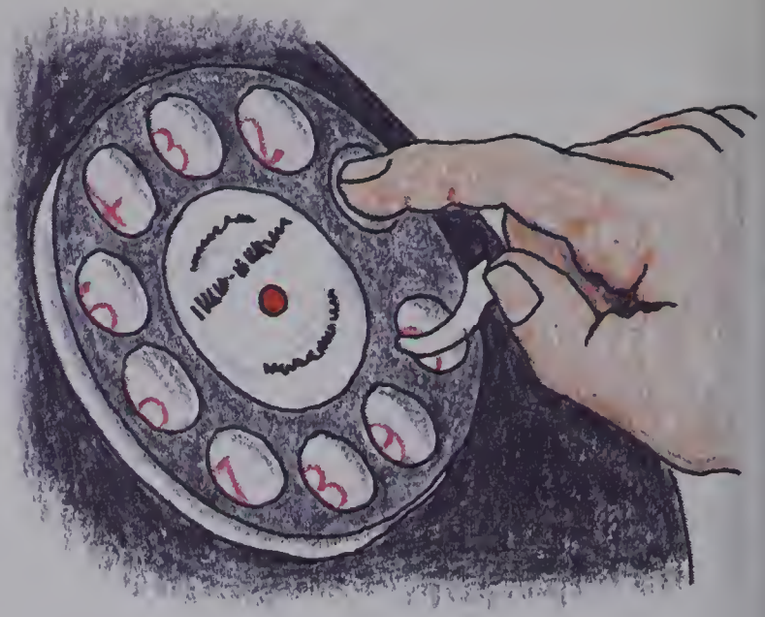
Make up other palindromes.
Try to make more palindromes that look the same when flipped.

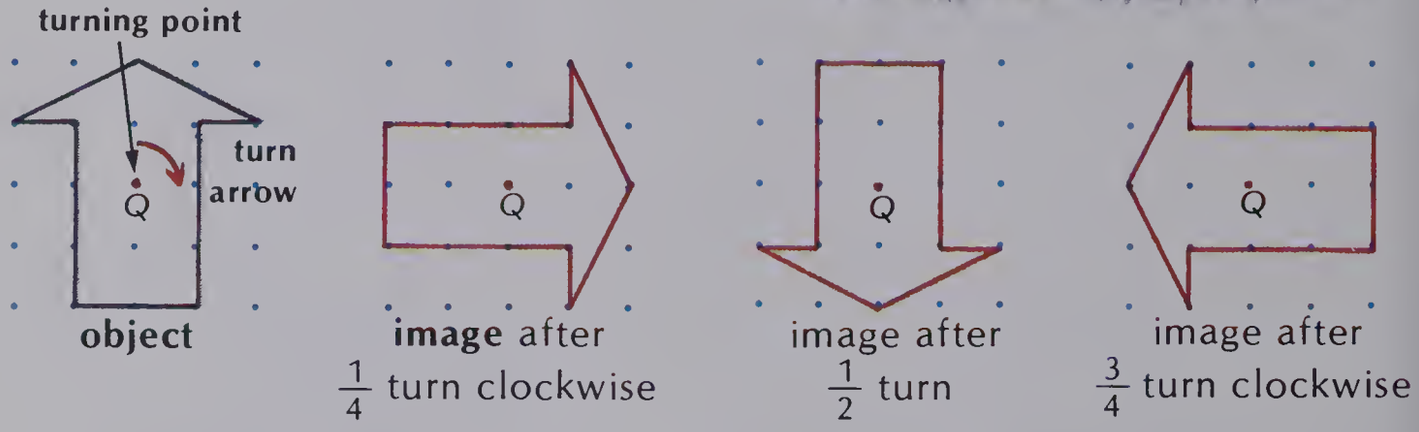
Turns

A figure can **turn** about a point.

These pictures show the images of a figure being turned **clockwise**.

Q is the **turning point**.

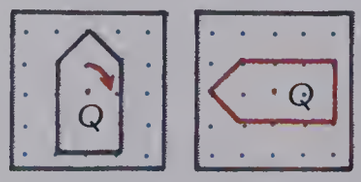


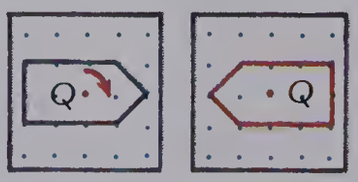


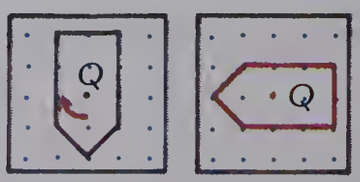
After a **full turn**, the image will be back in the same position as the object.

EXERCISES

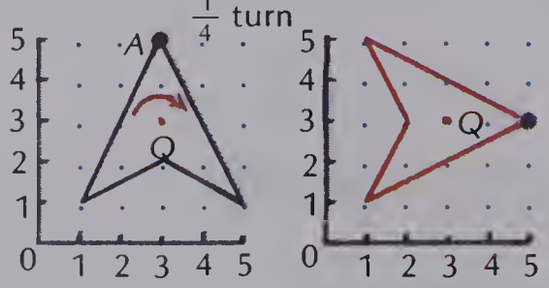
Write $\frac{1}{4}$ turn, $\frac{1}{2}$ turn, or $\frac{3}{4}$ turn for each clockwise turn about Q.

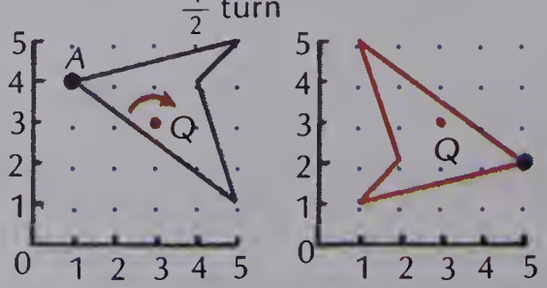
1. 

2. 

3. 

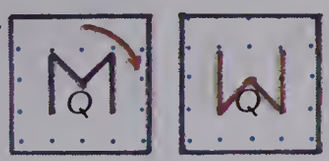
Write the ordered pair for the image of *A*.

4. 

5. 

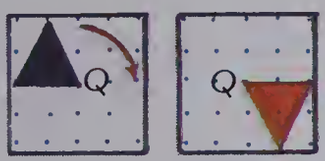
PRACTICE

Write $\frac{1}{4}$ turn, $\frac{1}{2}$ turn, or $\frac{3}{4}$ turn for each clockwise turn about Q.

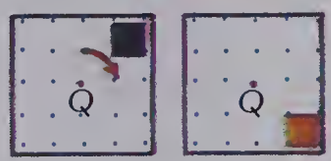
1. 

2.

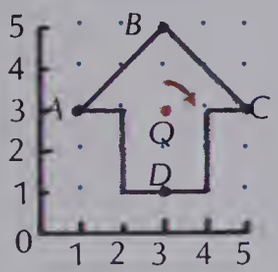
3.

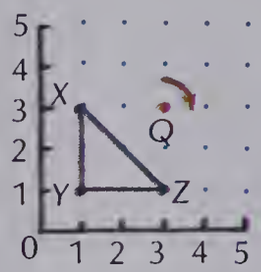
4. 

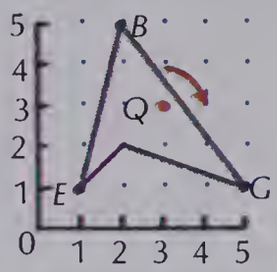
5.

6. 

Write the ordered pair for each point after a half turn about Q.

7. 

8. 

9. 

10. What is the size of the angle in a $\frac{1}{4}$ turn? a $\frac{1}{2}$ turn? a $\frac{3}{4}$ turn?

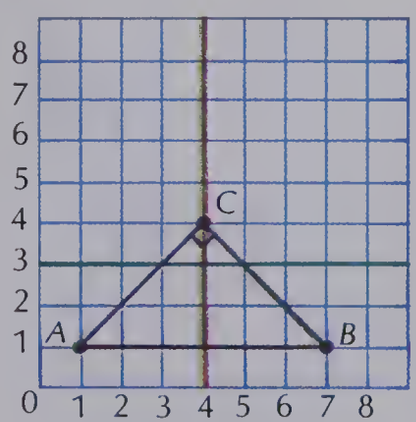
REVIEW

G1 1. Name the ordered pair for the image of point A after a slide of right 1, up 4.

G2 2. Which is a line of symmetry for triangle ABC: the green line or the red line?

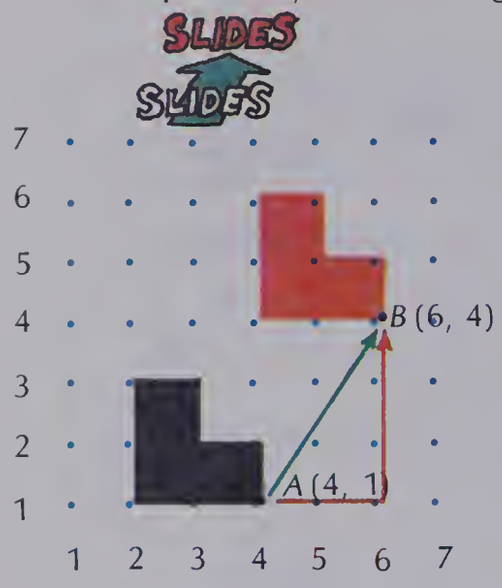
G3 3. Name the ordered pair for the image of A after a flip over the green line.

G4 4. Name the ordered pair for the image of B after a $\frac{1}{4}$ turn clockwise about C.



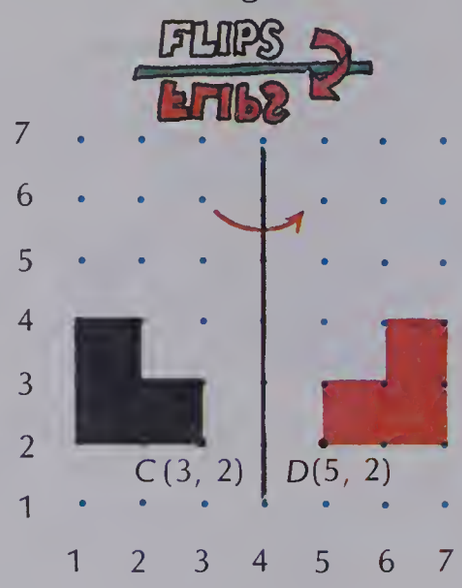
Slides, Flips, and Turns

In each picture, the red figure is the image of the black figure.



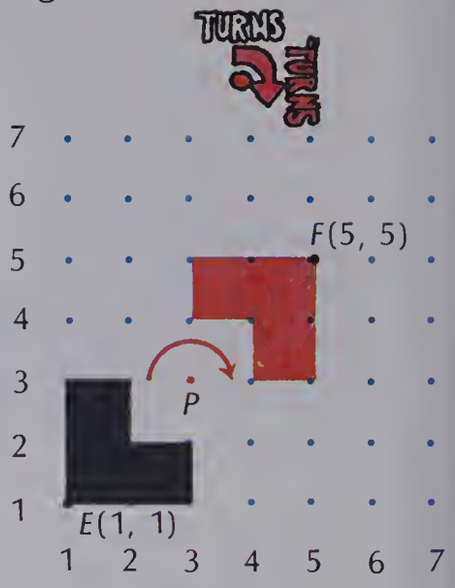
This image results from a slide of right 2, up 3.

$A\ (4,\ 1) \longrightarrow B\ (6,\ 4)$



This image results from a flip over the black line.

$C\ (3,\ 2) \longrightarrow D\ (5,\ 2)$



This image results from a $\frac{1}{2}$ turn about point P.

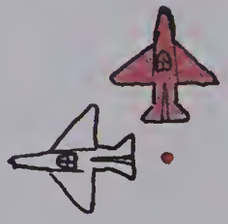
$E\ (1,\ 1) \longrightarrow F\ (5,\ 5)$

EXERCISES

Is the image produced by a slide, flip, or turn?

1.

2.



3.

4.

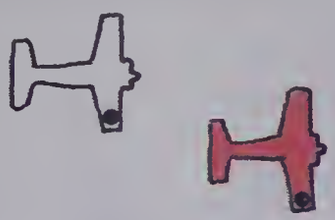
5.

6.

PRACTICE

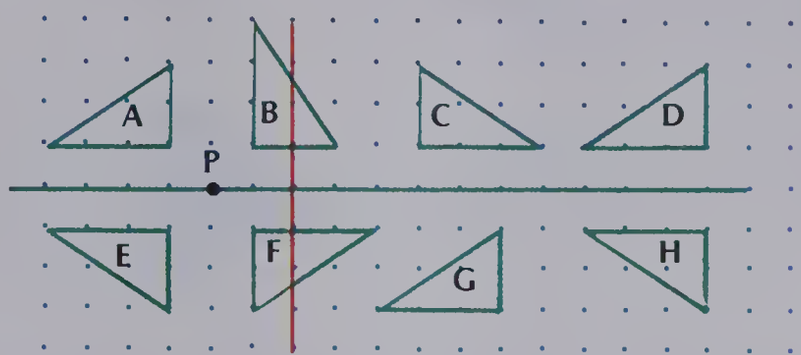
Is the image produced by a slide, flip, or turn?

1.

2. 

3.

Find the image of triangle **A** after these motions.



4. after a flip over the red line
5. after a slide to the right
6. after a $\frac{1}{2}$ turn about *P*
7. after a slide of right 8, down 4
8. after a flip over the green line
9. after a $\frac{1}{4}$ turn clockwise about *P*

Special Combinations

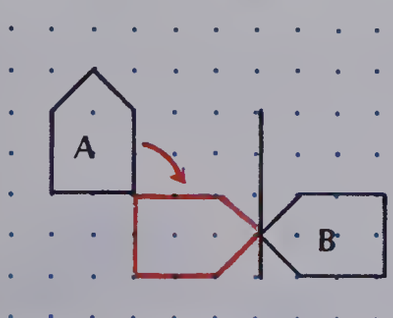
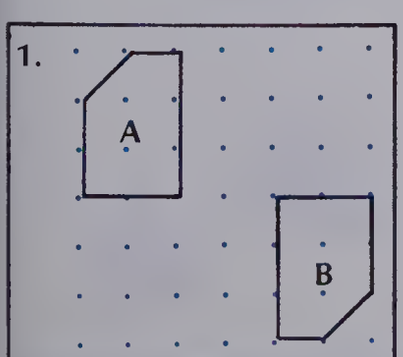
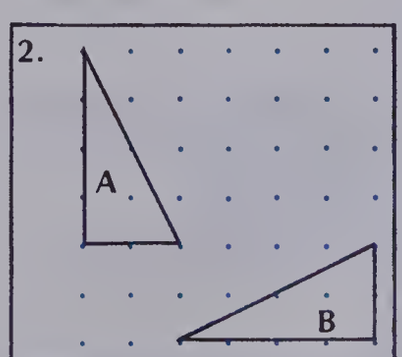
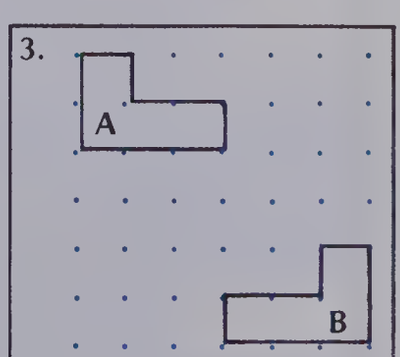


Figure **B** is the image of figure **A** after a turn **and** then a flip.

How is figure **B** produced from figure **A** in each diagram?

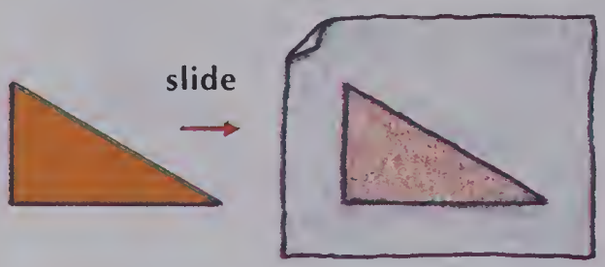
1. 

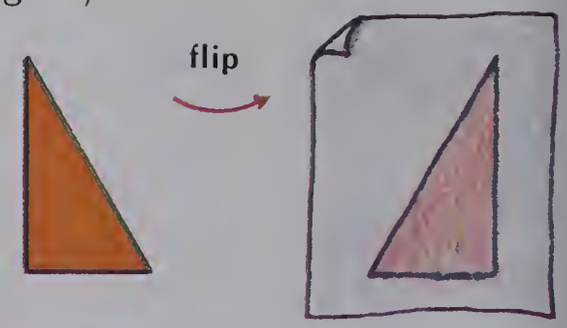
2. 

3. 

Congruence

If a tracing of a figure fits exactly on a second figure, then the two figures are **congruent**.

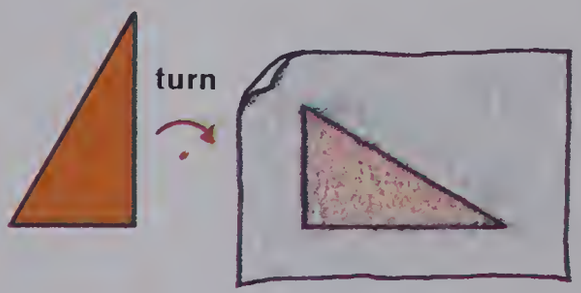




Trace the first triangle and **slide** the tracing over the second triangle. If it fits, the triangles are congruent.

Trace the first triangle and **flip** the tracing onto the second triangle. If it fits, the triangles are congruent.

Trace the first triangle and **turn** the tracing onto the second triangle. If it fits, the triangles are congruent.

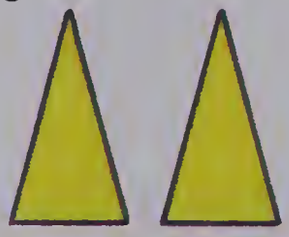


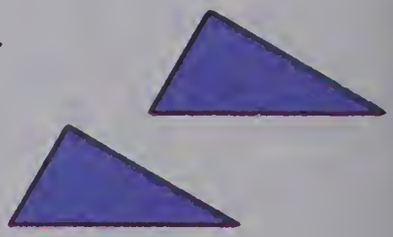
The tracing can be moved through any combination of slides, flips, and turns to test for congruence.

EXERCISES

Using tracings to test for congruence.

1.

2. 

3. 

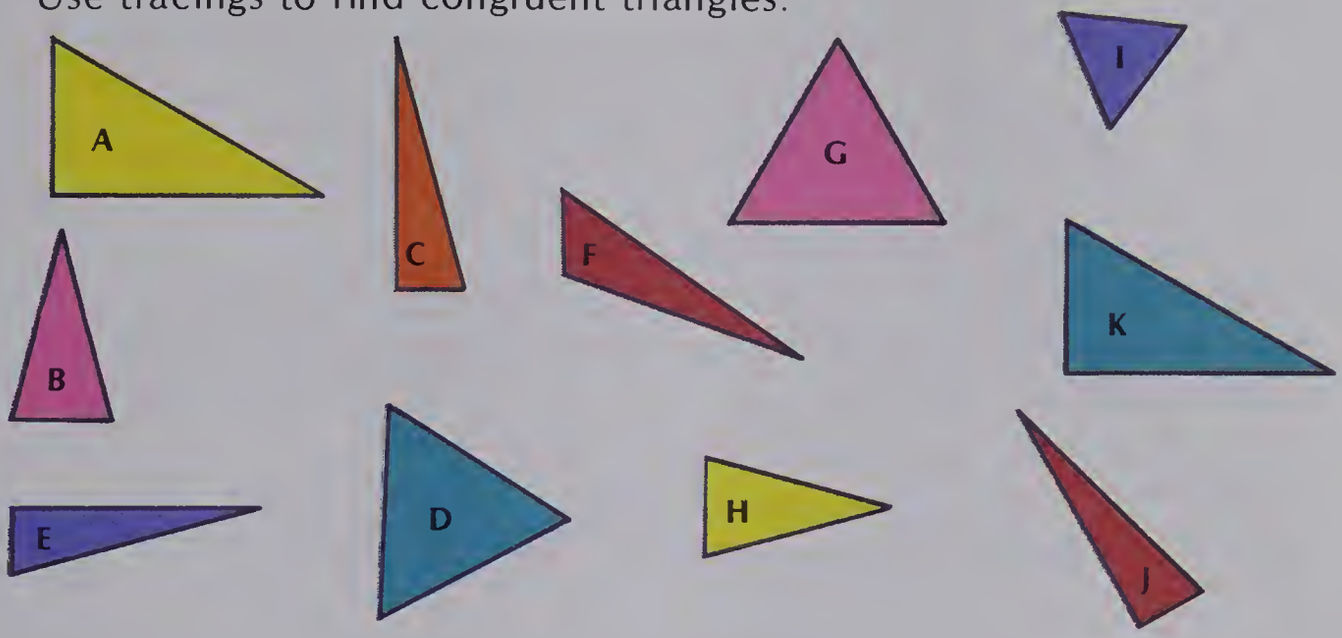
4.

5.

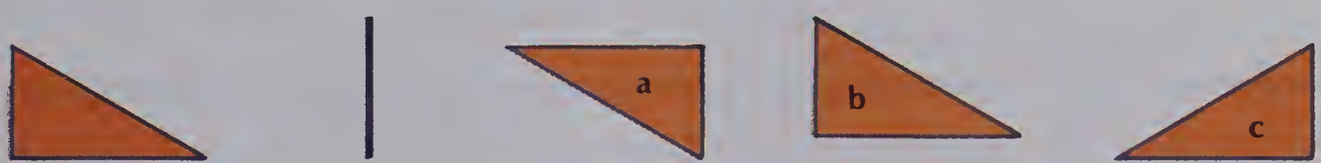
6.

PRACTICE

1. Use tracings to find congruent triangles.



2. Which triangle is a slide image of the first triangle?(Use tracing paper.) Which is the flip image? Which is the turn image?



3. Draw a right triangle on grid paper. Then draw a triangle that is the slide image of the first triangle.

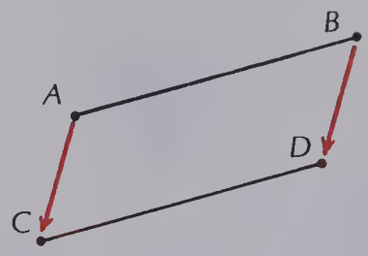
4. Draw another right triangle. Then draw a triangle that is its flip image.

5. Draw another right triangle. Then draw a triangle that is its turn image.

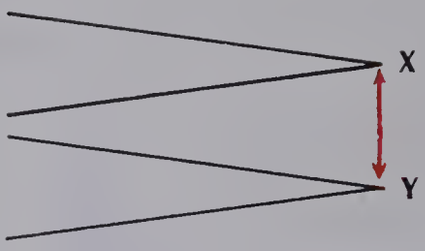
Tracing Challenge

Trace the figure without lifting your pencil from the paper and without retracing any lines.

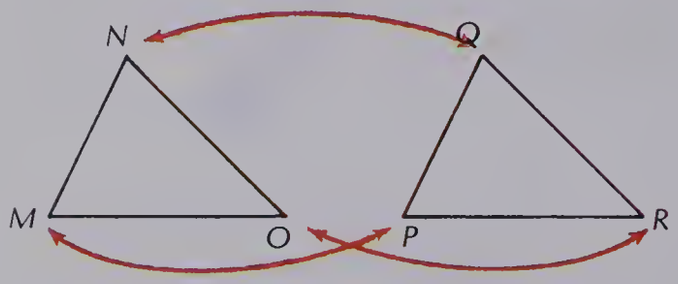
Congruence



congruent segments
Point *A* matches point *C*.
Point *B* matches point *D*.



congruent angles
Angle **X** matches angle **Y**.



congruent triangles

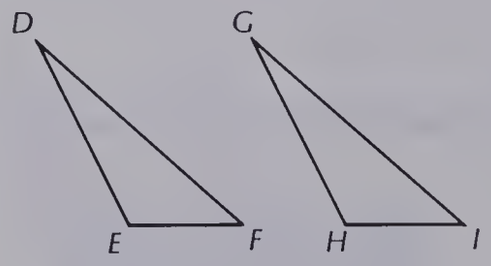
Matching vertices and angles: *M* and *P*
N and *Q*
O and *R*

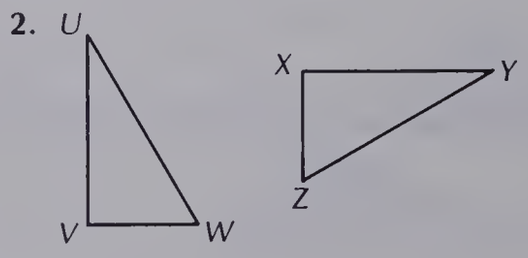
Matching sides: *MN* and *PQ*
NO and *QR*
MO and *PR*

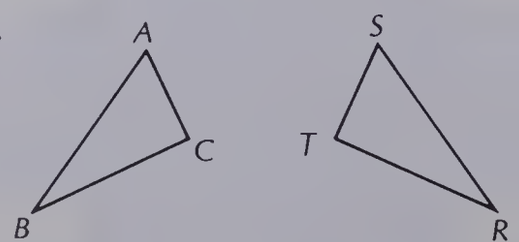
Matching parts of congruent figures are called **corresponding** parts.

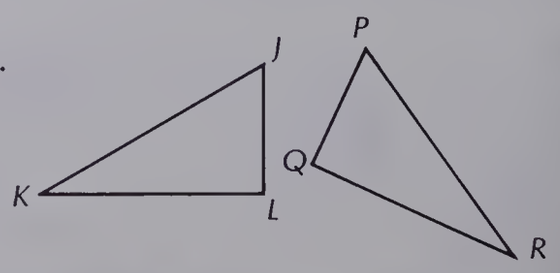
EXERCISES

Name the corresponding vertices, angles, and sides in each pair of congruent triangles.

1. 

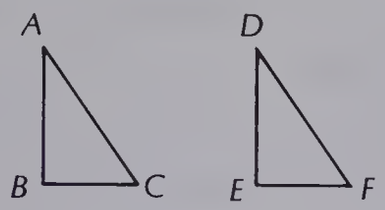
2. 

3. 

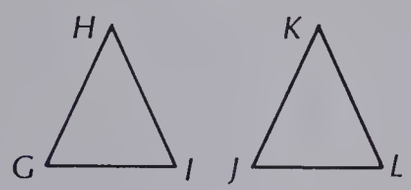
4. 

PRACTICE

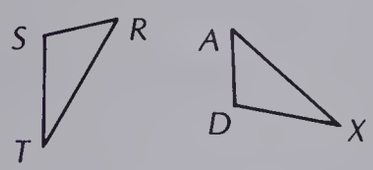
Study the congruent triangles and complete the statements.

1. 

Segment *AB* is congruent to ■.
Angle **C** is congruent to ■.
Triangle *ABC* is congruent to ■.

2. 

Segment *GI* is congruent to ■.
Angle **K** is congruent to ■.
Triangle *JKL* is congruent to ■.

3. 

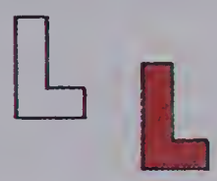
Segment *RT* is congruent to ■.
Angle **R** is congruent to ■.
Triangle *RST* is congruent to ■.

4. Guess and test: In triangles *ABC* and *DEF*, sides *AB* and *DE* are congruent. Angles *A* and *D* are congruent. Angles *B* and *E* are congruent. Are the two triangles congruent?

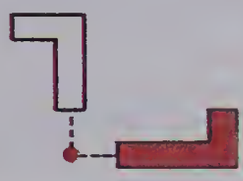
REVIEW

G5

Is the red figure a slide image, a flip image, or a turn image?

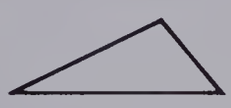
1. 

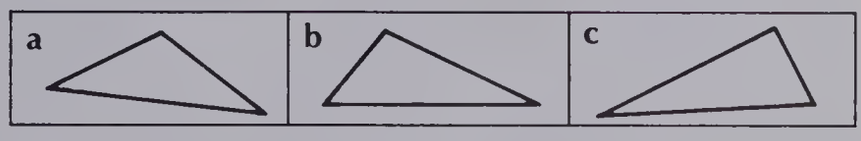
2.

3. 

G6

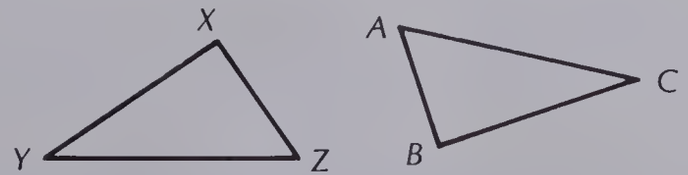
4. Which triangle is congruent to the first one?





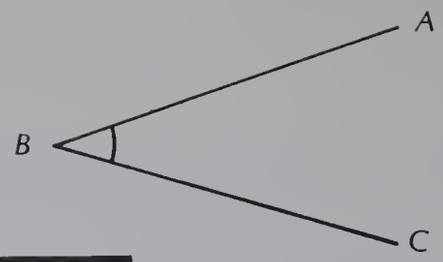
G7

5. Name one pair of corresponding sides.

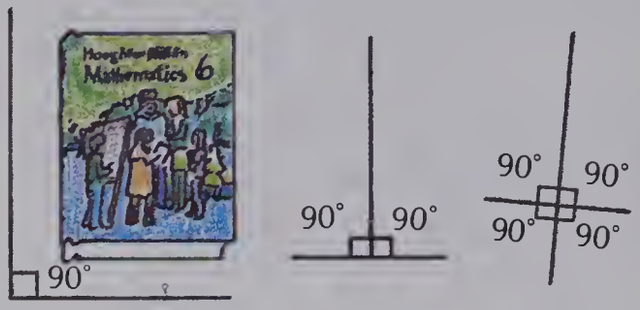


Lines and Angles

Line segments AB and BC meet (intersect) to form angle ABC.

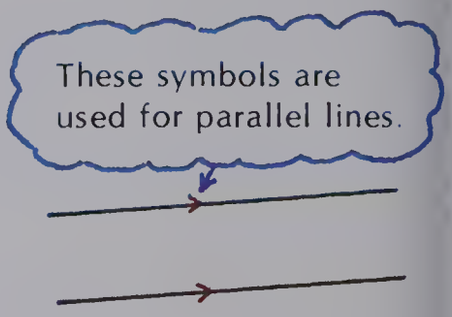


When two lines intersect at right angles, they are called **perpendicular** lines. They form 90° angles.



The bottom of a door and one side of the door are **perpendicular**.

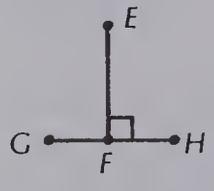
When two lines will never intersect, they are called **parallel** lines.



The opposite edges of a door are **parallel**.

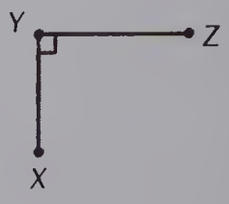
EXERCISES

Write a statement about each figure, such as "AB is parallel to CD."

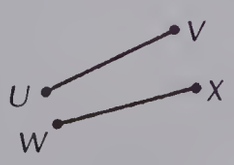
1. 

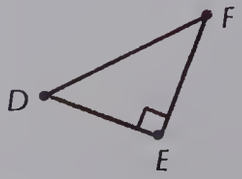
2.

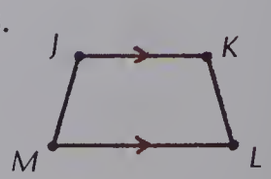
3.

4. 

5.

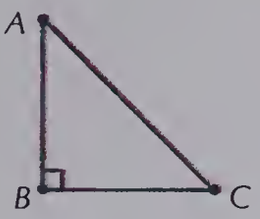
6. 

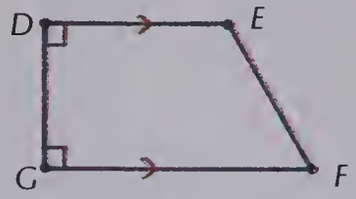
7. 

8. 

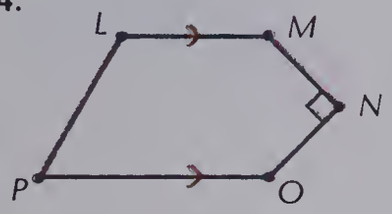
PRACTICE

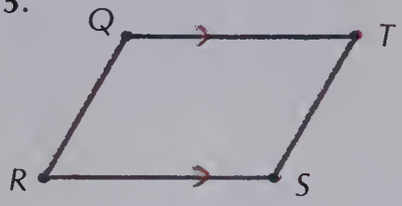
In each figure, name the perpendicular segments and the parallel segments.

1. 

2. 

3.

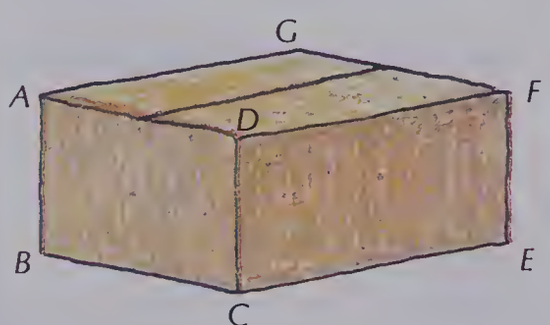
4. 

5. 

6.

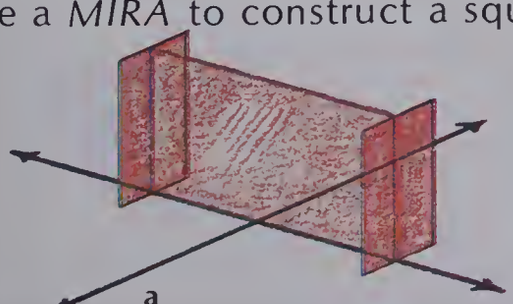
Complete each statement. (Use a real box and label the vertices.)

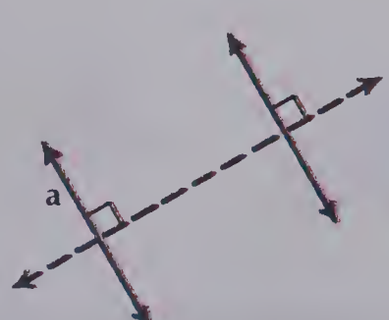
7. **a.** Segments *CD* and *DF* are ■.
   b. Segments *CD* and *EF* are ■.
   c. Segments *CE* and *DF* are ■.
   d. Segments *AB* and *CD* are ■.
   e. Segments *AB* and *BC* are ■.
   f. Segments *AG* and *GF* are ■.
   g. Segments *AG* and *CE* are ■.



MIRA Constructions

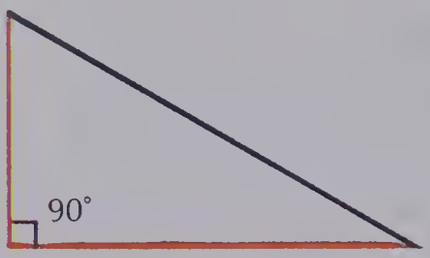
Draw a line and label it **a**.
Use a *MIRA* to construct a line perpendicular to **a**.
Use a *MIRA* to construct a line parallel to **a**.
Use a *MIRA* to construct a rectangle.
Use a *MIRA* to construct a square.





Triangles

Some triangles have special names.

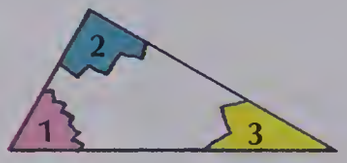


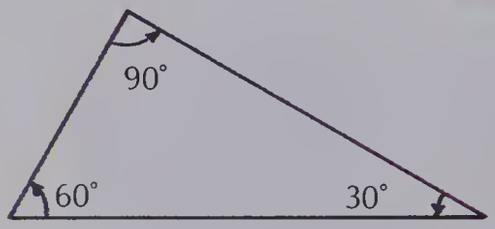
A **right triangle** has one right angle.

An **isosceles triangle** has 2 congruent sides. It also has two congruent angles.

An **equilateral triangle** has 3 congruent sides. It also has 3 congruent angles.

The sum of the angles of any triangle is 180°.

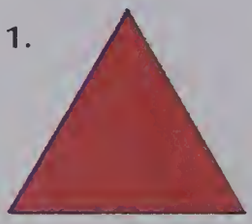




$60° + 90° + 30° = 180°$

EXERCISES

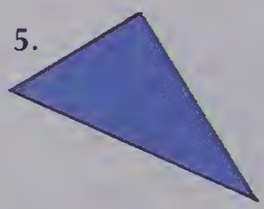
Is the triangle isosceles, right, or equilateral?
Use tracing paper to find out.

1. 

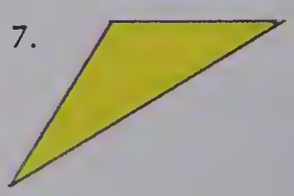
2.

3.

4.

5. 

6.

7. 

8.

PRACTICE

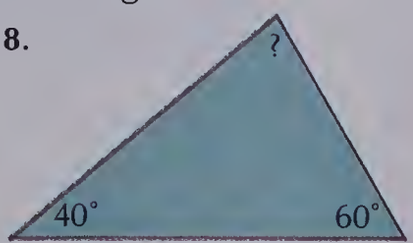
What type of triangle is it? Why?

1. Sides: 4 cm, 8 cm, and 8 cm
2. Sides: 8.2 cm, 3.5 cm, and 8.2 cm
3. Sides: 5.5 cm, 5.5 cm, and 5.5 cm
4. Each side is 5 m long.
5. Angles: 45°, 45°, and 90°
6. Angles: 35°, 90°, and 55°

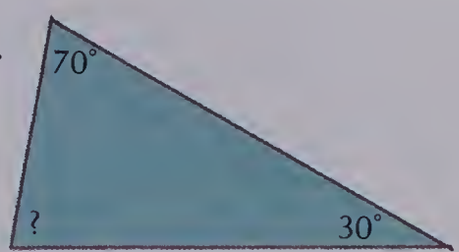
What is the size of the third angle?

7.

8.



9.

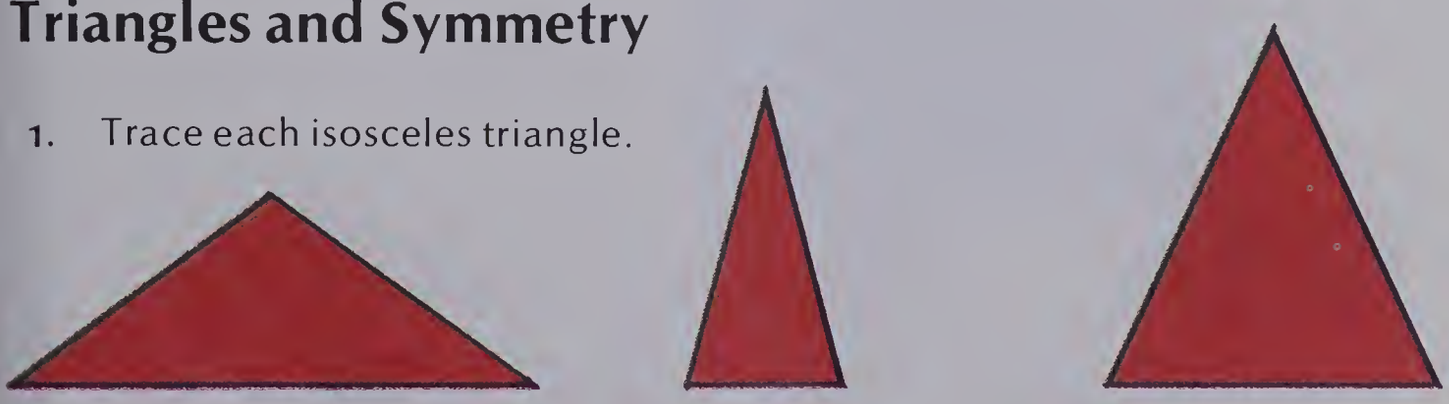


10. 20°, 30°
11. 35°, 35°
12. 70°, 80°
13. 29°, 41°
14. 100°, 40°
15. 37°, 58°

16. What is the size of each angle of an equilateral triangle?
17. What is the size of each angle of an isosceles right triangle?

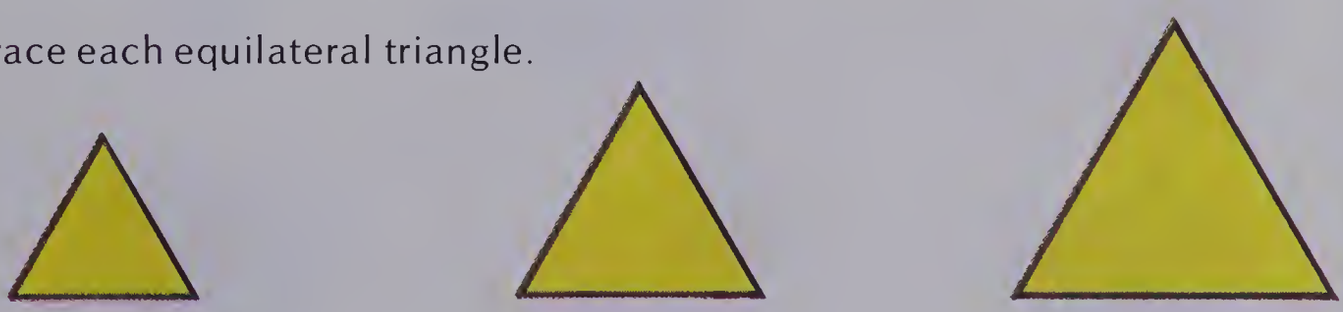
Triangles and Symmetry

1. Trace each isosceles triangle.



   a. Draw a line of symmetry for each isosceles triangle.
   b. Write a statement about lines of symmetry of isosceles triangles.

2. Trace each equilateral triangle.



   a. Draw the lines of symmetry for each equilateral triangle.
   b. Write a statement about lines of symmetry of equilateral triangles.

Quadrilaterals

Some quadrilaterals have special names.

A **parallelogram** is a quadrilateral whose opposite sides are parallel. Its opposite sides are also congruent.

A **rectangle** is a right-angled parallelogram.

A **rhombus** is a parallelogram with four congruent sides.

A **square** is a rectangle with four congruent sides. A **square** is a right-angled **rhombus**.

EXERCISES

What is a special name for each quadrilateral?

1.

2.

3.

4.

5.

6.

PRACTICE

1. Draw a parallelogram that isn't a rectangle or rhombus.
2. Draw a rectangle that isn't a square.
3. Draw a rhombus that isn't a square.
4. Draw a square and label it *ABCD*.
5. How many lines of symmetry do the figures you drew above have?

True or false.

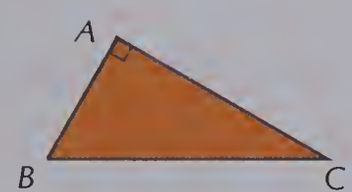
6. A square is a parallelogram.
7. A rhombus is a rectangle.
8. A rectangle is a parallelogram.
9. A square is a rectangle.

10. These quadrilaterals are **trapezoids**.
    a. Write a statement describing a trapezoid.
    b. True or false: A trapezoid is a parallelogram.
    c. True or false: A parallelogram is a trapezoid.

REVIEW

G8

Name the perpendicular and parallel segments.

1. 

2.

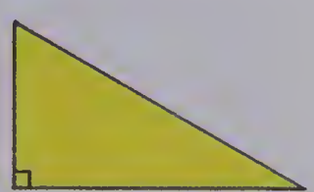
3.

G9

What type of triangle is it? (right, isosceles, equilateral)

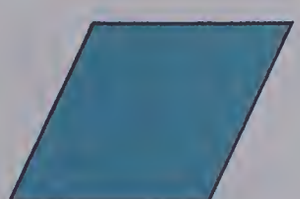
4.

5.

6. 

G10

What type of quadrilateral is it?

7. 

8.

9.

TEST UNIT 12

How many lines of symmetry does each figure have?

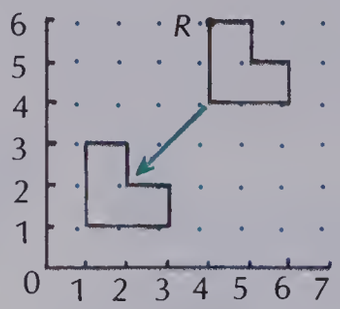
1.

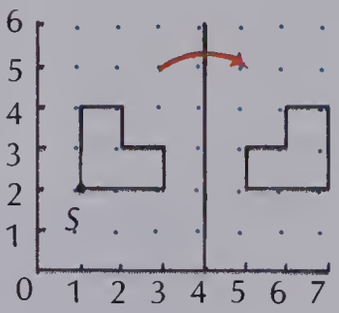
2.

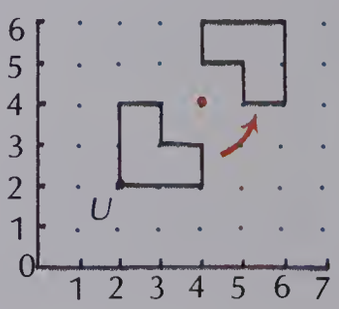
3.

4.

Write slide, flip, or turn.

5. 

7. 

9. 

6. R is at (■, ■). The image of R is at (■, ■).

8. S is at (■, ■). The image of S is at (■, ■).

10. U is at (■, ■). The image of U is at (■, ■).

Are the figures congruent or not congruent? Use tracings.

11.

12.

13.

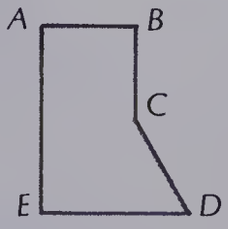
The figures on the right are congruent. Complete the statements.

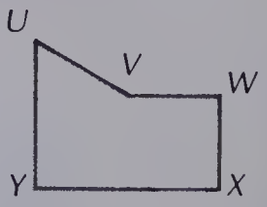
14. Angle D is congruent to ■.

15. Side BC is congruent to ■.

16. Sides AE and ED are ■.

17. Sides AE and BC are ■.

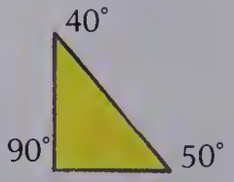




Name the triangle. (isosceles, equilateral, right)

18.

19.

20. 

21. A quadrilateral with two pairs of parallel sides is called a ■.

22. A rhombus with angles of 90° is called a ■.

23. A parallelogram with angles of 90° is called a ■.

LOOKING BACK

COMPUTATION

Calculate.

1. $\begin{array}{r} 423 \\ +964 \\ \hline \end{array}$

2. $\begin{array}{r} 27 \\ 9 \\ +365 \\ \hline \end{array}$

3. $\begin{array}{r} 6.8 \\ 47.6 \\ +97.3 \\ \hline \end{array}$

4. $\begin{array}{r} 8.76 \\ 9.4 \\ +67.85 \\ \hline \end{array}$

5. $\begin{array}{r} 9002 \\ -2765 \\ \hline \end{array}$

6. $\begin{array}{r} 2408 \\ -693 \\ \hline \end{array}$

7. $\begin{array}{r} 50.0 \\ -37.16 \\ \hline \end{array}$

8. $\begin{array}{r} 36.2 \\ -3.45 \\ \hline \end{array}$

9. $\begin{array}{r} 17 \\ \times 56 \\ \hline \end{array}$

10. $\begin{array}{r} 63 \\ \times 25 \\ \hline \end{array}$

11. $\begin{array}{r} 947 \\ \times 659 \\ \hline \end{array}$

12. $\begin{array}{r} 2473 \\ \times 7000 \\ \hline \end{array}$

13. $\begin{array}{r} 972 \\ \times 0.3 \\ \hline \end{array}$

14. $\begin{array}{r} 34.6 \\ \times 1.2 \\ \hline \end{array}$

15. $\begin{array}{r} 6.8 \\ \times 4.7 \\ \hline \end{array}$

16. $\begin{array}{r} 473.1 \\ \times 0.01 \\ \hline \end{array}$

17. $9\overline{)522}$

18. $8\overline{)3264}$

19. $26\overline{)417}$

20. $75\overline{)3000}$

21. $4\overline{)15.3}$

22. $0.2\overline{)24.6}$

23. $0.3\overline{)95.4}$

24. $0.1\overline{)0.7}$

25.

N	83.4 + N
96	
0.8	
2.19	
7	
0.27	

26.

N	N ÷ 86
258	
86	
1462	
455.8	
860	

27.

N	0.4 × (N − 1.5)
1.5	
3	
2	
11.5	
37.5	

Solve.

28. The Sobels planned on travelling 415 km in the first day of their holiday. In the first two hours, they went 166 km. At that rate, how long did they travel the first day?

UNIT 13
GRAPHS & APPLICATIONS
Tangier
Alger
Tunis
Casablanca
Rabat
Cairo
A
W
E
PRIME MERIDIAN
B
C
E
Dakar
Khartoum
D
Freetown
Lagos
Addis Ababa
Abidjan
Accra
Douala
N
EQUATOR
S
Kampala
F
Nairobi
Kinshasa
Dar-es Salaa
Luanda
G
H
Mozambiqu
Salisbury
Tananarive
Bulawayo
I
K
Pretoria
L
Johannesburg
J
Durban
Cape Town

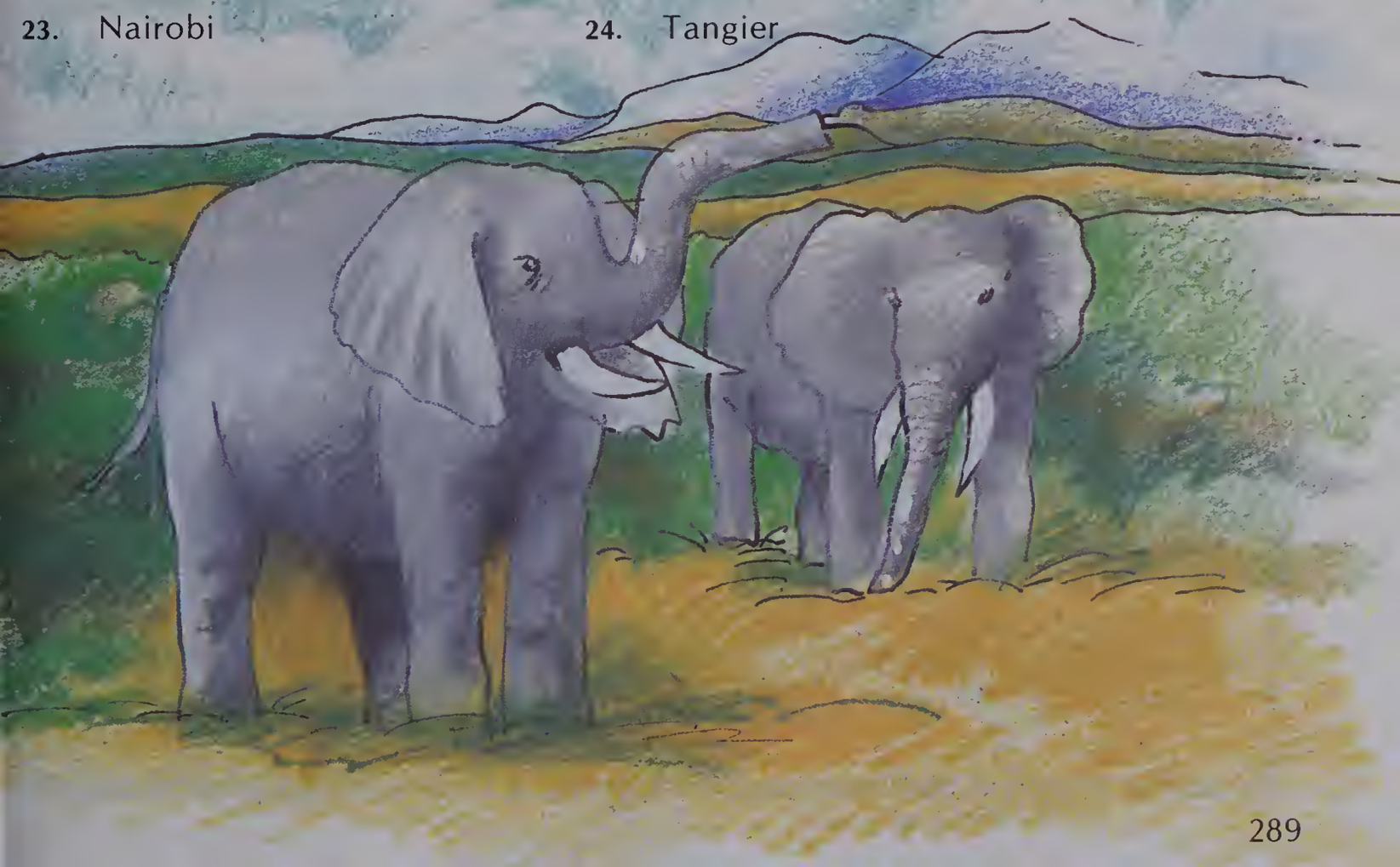
African Safari

What letter appears at each location?

1. 20°N 10°E
2. 20°N 10°W
3. 0° 20°E
4. 10°S 10°E
5. 10°S 30°E
6. 20°S 10°W
7. 30°S 10°E
8. 15°N 20°E
9. 25°S 20°E
10. 25°S 45°E

Give the approximate location.

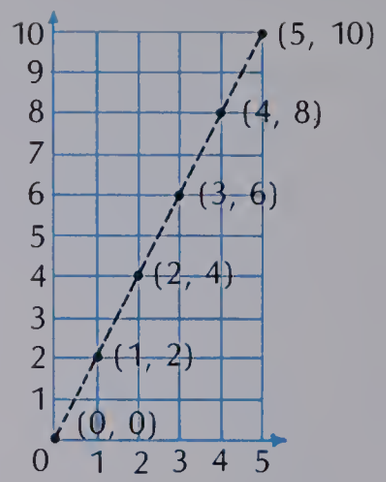
11. Cairo
12. Accra
13. Kampala
14. Tunis
15. Durban
16. Mozambique
17. Douala
18. Bulawayo
19. Kinshasa
20. Khartoum
21. Dakar
22. Abidjan
23. Nairobi
24. Tangier



Predictable Pairs

Rule: × 2	
0	0
1	2
2	4
3	6
4	8
5	10

Ordered pairs
(0, 0)
(1, 2)
(2, 4)
(3, 6)
(4, 8)
(5, 10)

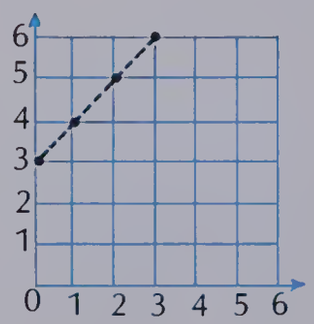


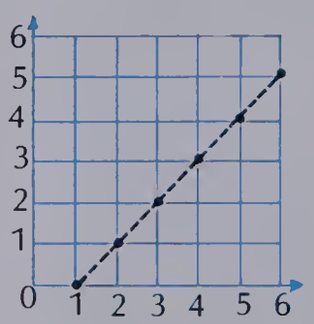
EXERCISES

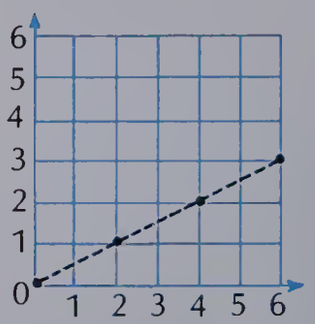
Copy and complete the pattern. State the rule.

1. (1, 0) (2, 1) (3, 2) (4, 3) (5, ■) (6, ■) (7, ■)
2. (0, 0) (1, 1) (2, 2) (3, 3) (4, 4) (5, ■) (6, ■) (7, ■)
3. (0, 3) (1, 4) (2, 5) (3, 6) (4, ■) (■, ■) (■, ■)
4. (0, 0) (2, 1) (4, 2) (6, 3) (8, 4) (10, ■) (■, ■) (■, ■)
5. (0, 5) (1, 6) (2, 7) (3, 8) (4, 9) (■, ■) (■, ■) (■, ■)

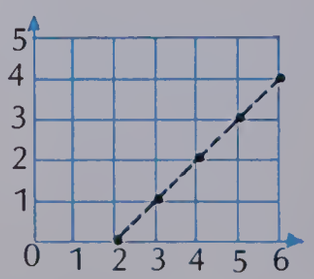
Match each graph to a set of ordered pairs above.

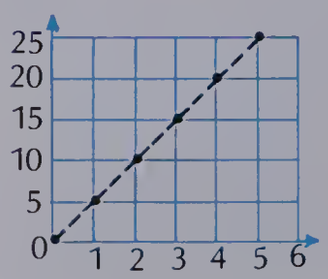
6. 

7. 

8. 

State the rule for the ordered pairs.

9. 

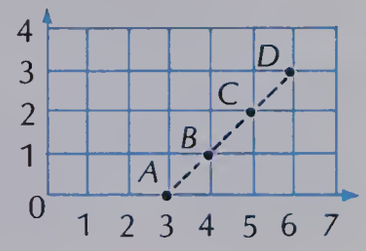
10. 

PRACTICE

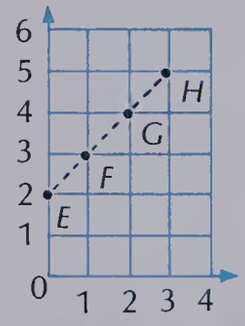
Copy and complete the pattern. State the rule.

1. (1, 2) (2, 3) (3, 4) ••• (8, ■)
2. (1, 3) (2, 6) (3, 9) ••• (8, ■)
3. (3, 1) (6, 2) (9, 3) ••• (24, ■)
4. (4, 0) (5, 1) (6, 2) ••• (11, ■)

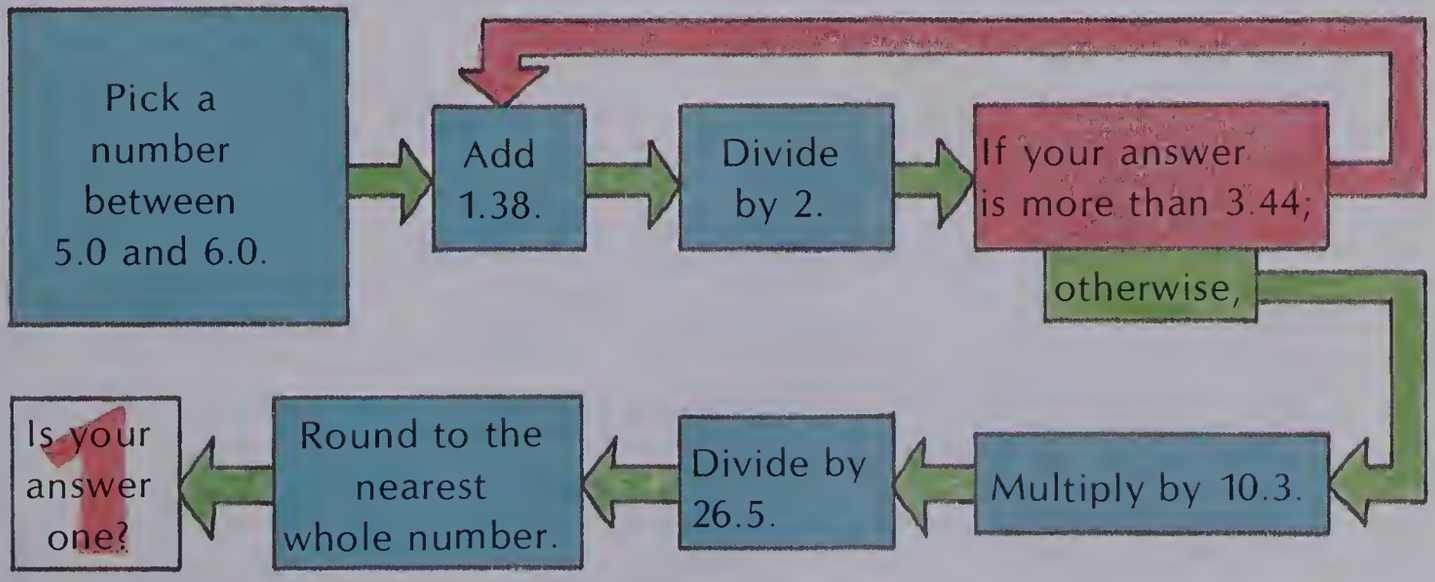
Use the graph on the right.



5. Write the ordered pairs for *A*, *B*, *C*, and *D*.
6. State the rule for the pattern.
7. Write the ordered pairs for *E*, *F*, *G*, and *H*.
8. State the rule for the pattern.
9. Graph the ordered pairs in question 1.
10. Graph the ordered pairs in question 2.



Calculator Maze



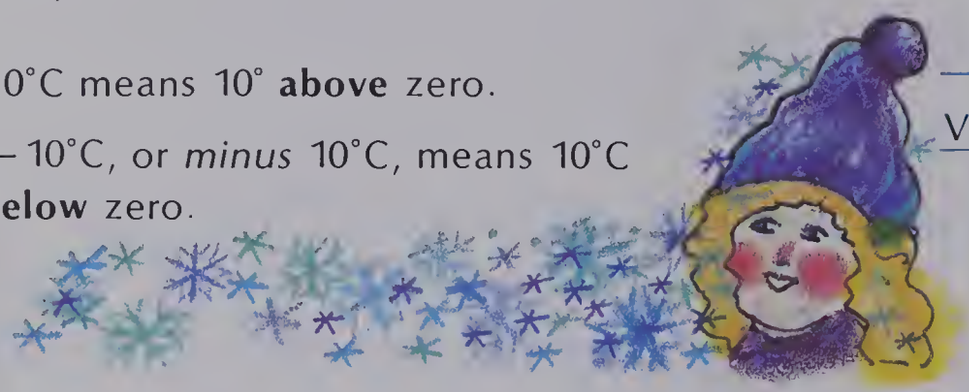
Temperature

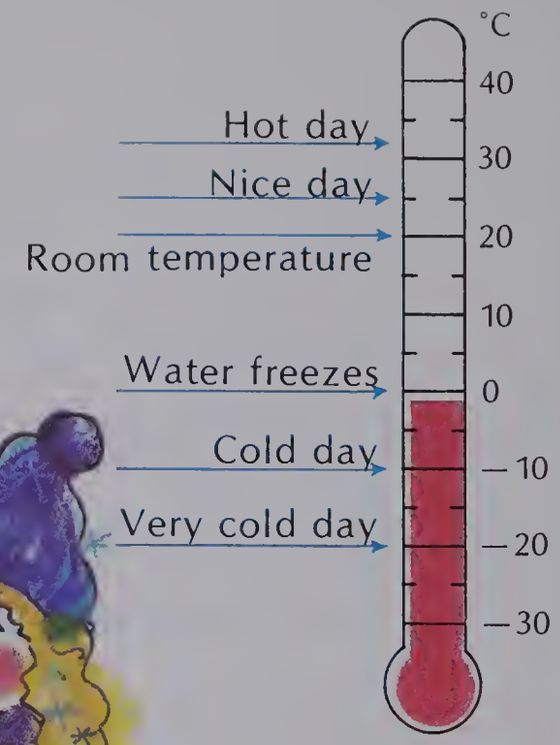
Temperatures *below* zero are marked on a thermometer in the **opposite direction** to temperatures *above* zero.

The colder it gets, the lower the temperature.

10°C means 10° **above** zero.

−10°C, or *minus* 10°C, means 10°C **below** zero.

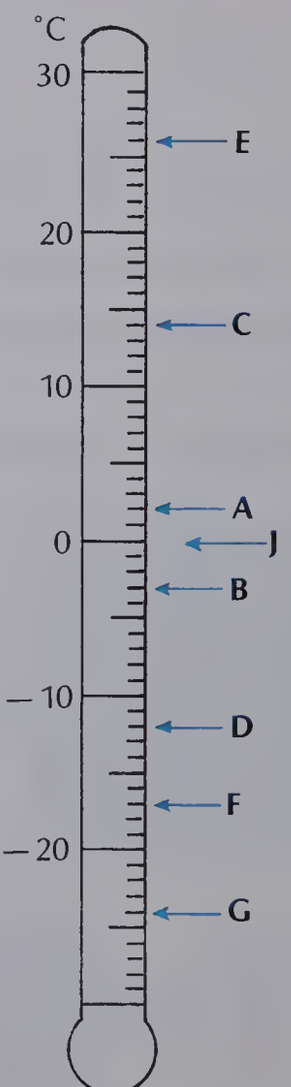




EXERCISES

Use the thermometer on the right. What is the temperature at each point?

1. A
2. B
3. C
4. D
5. E
6. F
7. G
8. J



Which temperature is higher?

9. 10°C or −10°C
10. −5°C or −15°C
11. 8°C or 32°C
12. −20°C or 4°C
13. 12°C or −14°C
14. −18°C or −11°C
15. 0°C or −5°C
16. 3°C or 0°C

Copy and complete using "is higher than" or "is lower than".

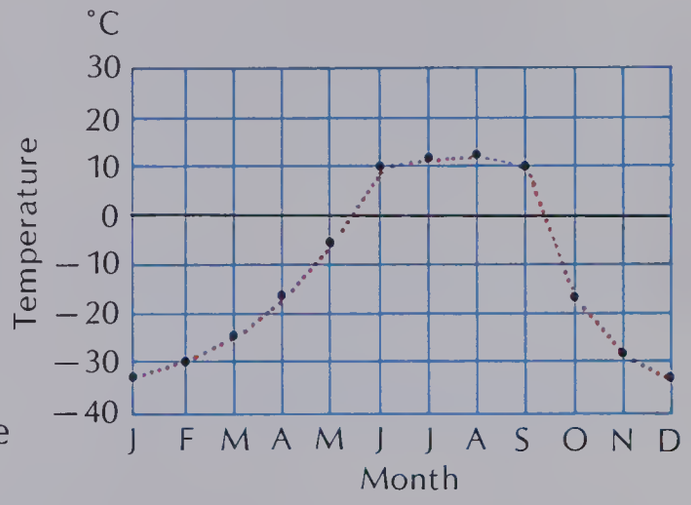
17. 2°C ● 18°C
18. 3°C ● −6°C
19. −12°C ● −15°C
20. −8°C ● 4°C
21. 32°C ● 9°C
22. −16°C ● −11°C
23. 19°C ● −27°C
24. 4°C ● 8°C

PRACTICE

Copy and complete using "is higher than" or "is lower than".

1. 12°C ● −12°C
2. 11°C ● 15°C
3. 5°C ● −25°C
4. −8°C ● 8°C
5. −7°C ● −4°C
6. −13°C ● −16°C

The graph shows the average monthly temperatures at Eureka in the Canadian Arctic.



7. What is the warmest month?
8. What months are coldest?
9. Which month is colder, November or February?
10. What is the average temperature during June?
11. What is the average temperature during May?
12. How much warmer is June than May?
13. How much colder is February than August?

Double Line Graph

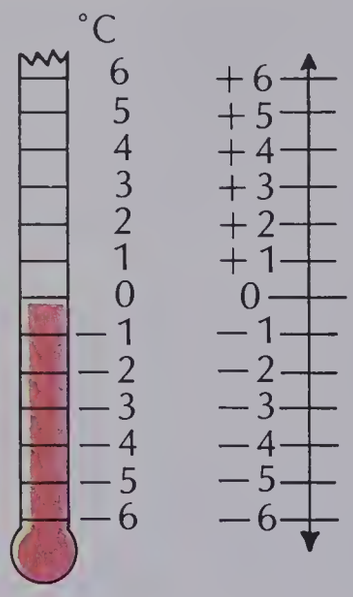
The chart shows the temperature at noon for one week in March and April.

	March	April
Sunday	−5°C	6°C
Monday	−3°C	4°C
Tuesday	−4°C	0°C
Wednesday	−1°C	−2°C
Thursday	3°C	−1°C
Friday	5°C	0°C
Saturday	4°C	0°C

Make a line graph to show this information.

Positive and Negative Numbers

The scale on a thermometer is an example of a number line.



On the number line, numbers above zero are **positive**.

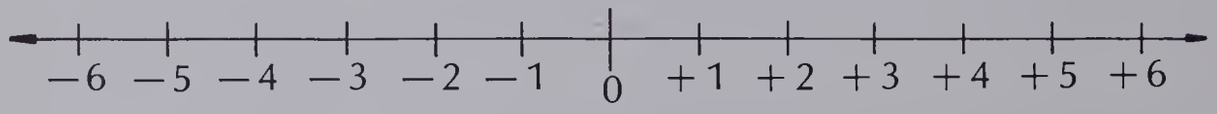
For example, **+4** is **positive four**.

Numbers below zero are **negative**.

For example, **−4** is **negative four**.

+4 and **−4** are **opposites**.
They are the same distance from zero, but in **opposite** directions.

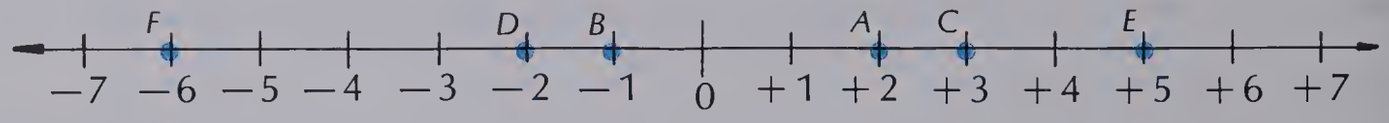
A number line can also be horizontal.



Numbers to the *left of 0* are *negative*.

Numbers to the *right of 0* are *positive*.

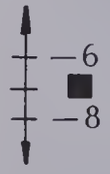
EXERCISES

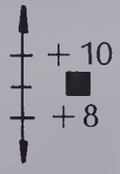


What number is at each letter on the number line?

1. *A* 2. *B* 3. *C* 4. *D* 5. *E* 6. *F*

What is the missing number?

7. 

8. 

9.

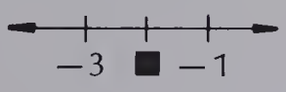
10.

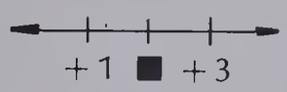
Name the opposite of each number.

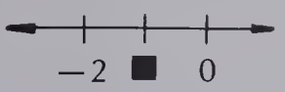
11. +5 12. −6 13. +10 14. −75 15. −43

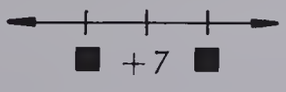
PRACTICE

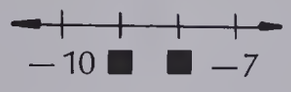
What are the missing numbers?

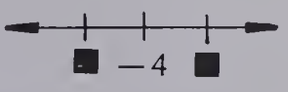
1. 

2. 

3. 

4. 

5. 

6. 

Copy and complete using "right" or "left" for a horizontal number line.

7. +3 is to the ■ of −3
8. −7 is to the ■ of −6
9. −5 is to the ■ of −10
10. +12 is to the ■ of +8

Solve.

11. If +5 shows 5 km east, what number shows 4 km west?
12. If −200 shows 200 m below sea level, what does +325 show?
13. If +25 shows $25 received, what number shows $10 spent?
14. If −15 shows 15 points lost, what does +8 show?
15. If −8 shows 8 s before blast-off, what number shows 3 s after blast-off?
16. If +4 shows members gained, what does −3 show?
17. If −10 shows 10° clockwise, what number shows 30° counterclockwise?

Using Your Head

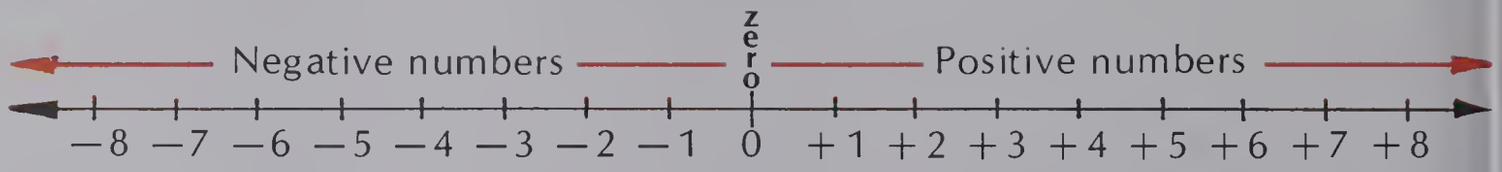
Solve the problem. Use a number line if you wish.

1. Ted and Tina are standing beside each other. Ted walks 3 m forward. Tina walks 4 m in the opposite direction. How far apart are they?

2. Julius Caesar was born in 100 B.C. Attila was born about 406 A.D. How many years apart were they born?

3. Amsterdam is about 600 km west of Berlin. Warsaw is about 550 km east of Berlin. How far apart are Amsterdam and Warsaw?

The Integers



Each number on the number line is called an **integer**.
The collection of all the negative numbers, zero, and all the positive numbers is called **the integers**.

For any two integers on a horizontal number line:

The integer on the *left* is **less than** the integer on the right.

$+3 < +8$

$-3 < +1$

$-6 < -5$

The integer on the *right* is **greater than** the integer on the left.

$+6 > +4$

$+2 > -3$

$-4 > -7$

EXERCISES

Name the next three integers.

1. to the right of zero
2. to the left of zero
3. to the right of $+8$
4. to the left of -7

Name the opposite of each number.

5. $+2$ 6. -2 7. $+37$ 8. -16 9. 0

Copy and complete using "right" or "left".

10. $+8$ is to the ■ of $+6$
11. -7 is to the ■ of -6
12. $+1$ is to the ■ of $+2$
13. -3 is to the ■ of -8
14. -4 is to the ■ of $+1$
15. $+5$ is to the ■ of 0

Copy and complete using $>$ or $<$.

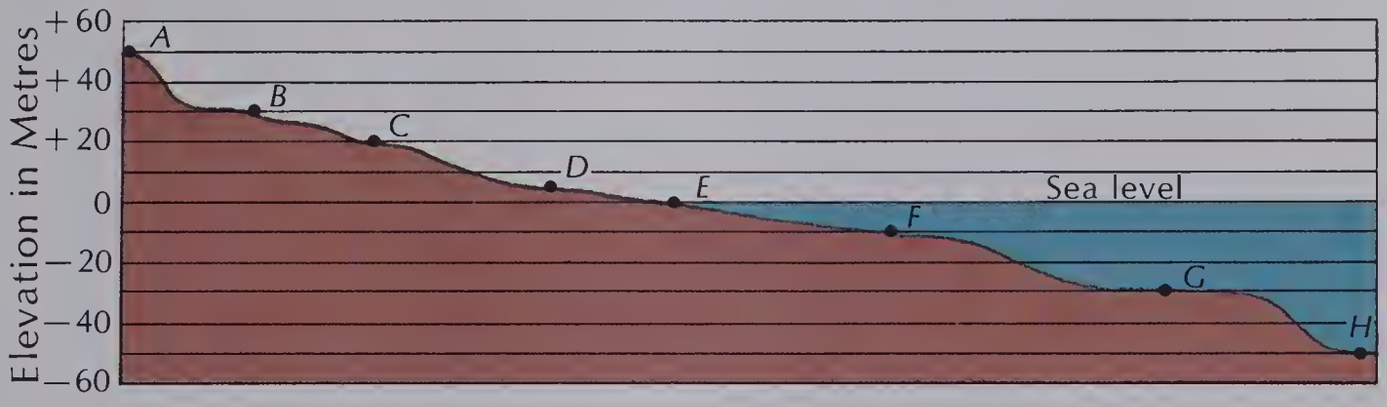
16. $+8$ ● $+6$
17. -7 ● -6
18. $+1$ ● $+2$
19. -3 ● -8
20. -4 ● $+1$
21. $+5$ ● 0
22. -3 ● $+5$
23. -25 ● -30
24. -50 ● -44

PRACTICE

Copy and complete using $>$ or $<$.

1. $+3 \bullet +5$
2. $+2 \bullet -2$
3. $-5 \bullet +10$
4. $-1 \bullet -8$
5. $+5 \bullet +3$
6. $+4 \bullet -1$
7. $-2 \bullet +4$
8. $-18 \bullet -27$
9. $-12 \bullet +1$

Profile of Land and Continental Shelf



10. What is the elevation at *A*? *B*? *D*? *E*?
11. What is the elevation at *F*? *G*? *H*?
12. How many metres higher is *B* than *C*?
13. How many metres deeper is *H* than *G*?
14. What is the difference in elevation between points *C* and *F*?

Solve.

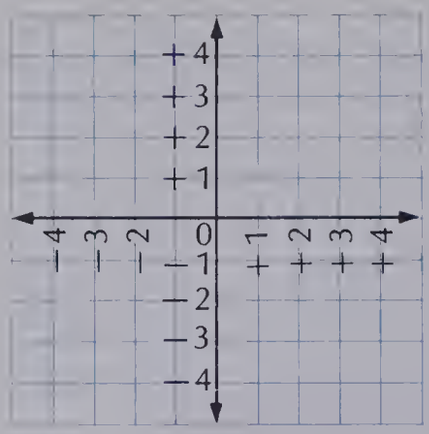
15. The greatest known depth of the Mediterranean Sea is -4632 m and of the Caribbean Sea, -6946 m. Which sea is deeper? By how much?
16. Which is better, to have -10 or -5 dollars in your account?

The Bottom of the Sea

Make a bar graph to show the maximum depth of these lakes.

Lake Victoria	82 m	Lake Winnipeg	62 m
Lake Aral	68 m	Lake Nicaragua	70 m
Lake Chad	7 m	Lake Urmia	15 m

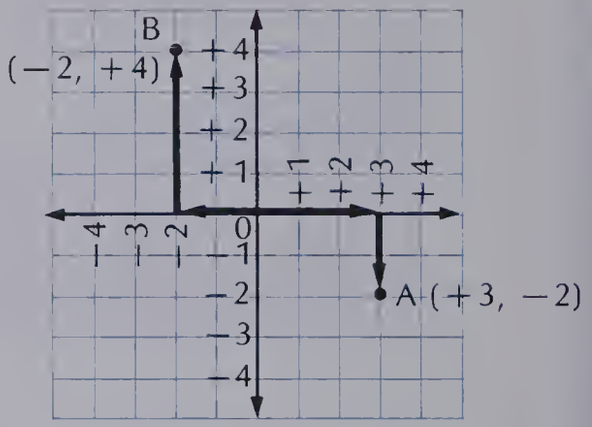
Positive and Negative Coordinates



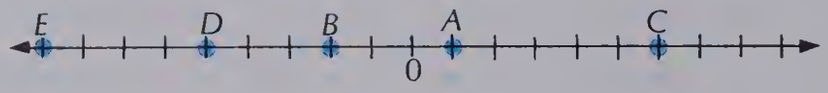
The horizontal and vertical number lines divide the grid into four parts.

Points are located on the grid as shown. $A\ (+3, -2)$ means, starting from the origin, go 3 right and 2 down to locate A.

$B\ (-2, +4)$ means, starting from the origin, go 2 left and 4 up to locate B.



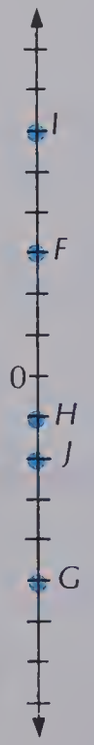
EXERCISES



Name the integer at the point.

1. A **2.** B **3.** C **4.** D **5.** E

6. F **7.** G **8.** H **9.** I **10.** J

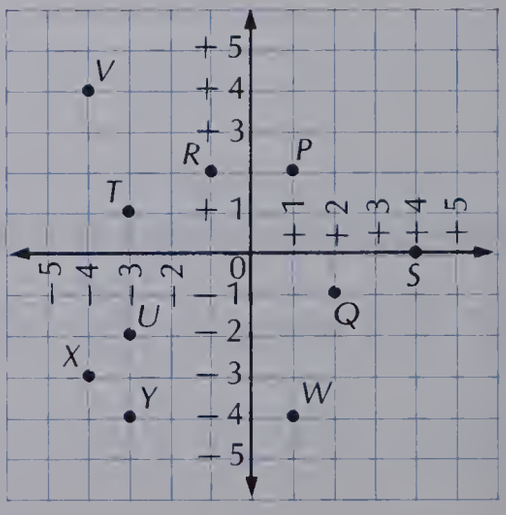


Name the point located by the ordered pair.

11. $(+1, +2)$ **12.** $(-3, +1)$

13. $(+2, -1)$ **14.** $(-3, -2)$

15. $(-1, +2)$ **16.** $(+4, 0)$



Write the ordered pair for the point.

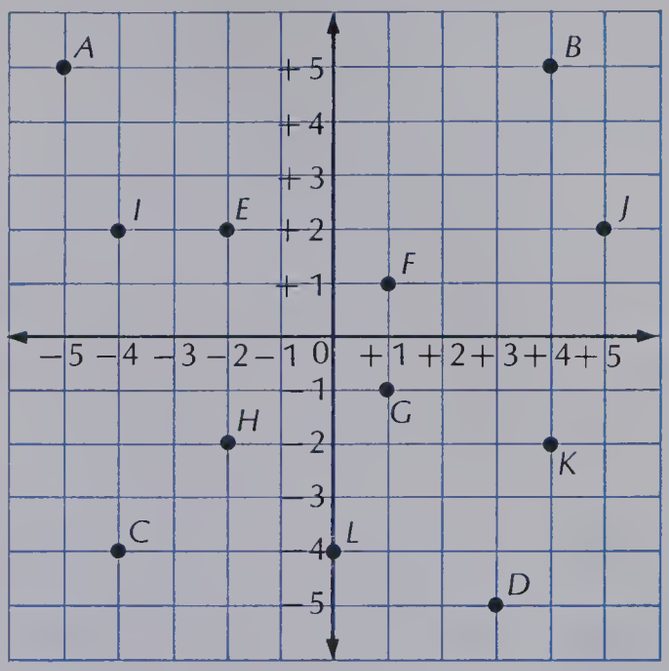
17. V **18.** W

19. X **20.** Y

PRACTICE

Name the point located by the ordered pair.

1. $(+4, +5)$
2. $(-5, +5)$
3. $(+3, -5)$
4. $(-2, +2)$
5. $(-4, -4)$
6. $(-2, -2)$



Write the ordered pair for the point.

7. F
8. G
9. I
10. J
11. K
12. L

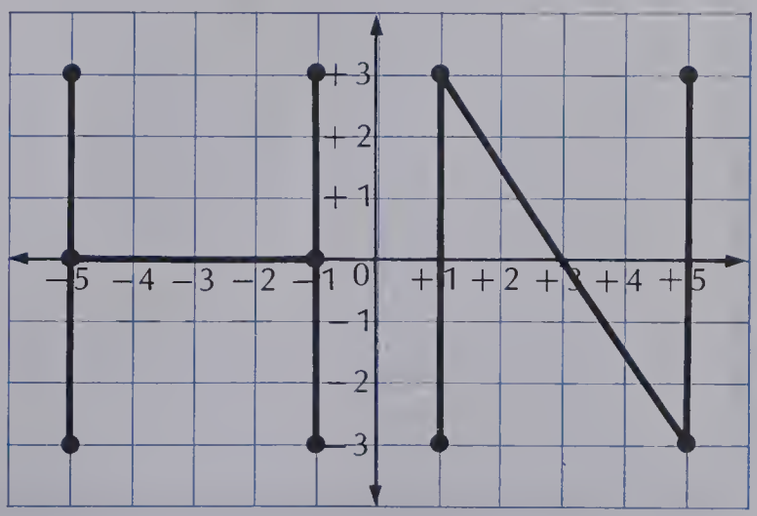
13. Draw horizontal and vertical number lines on grid paper. Graph these points: $L\ (+4, -4)$, $M\ (-2, +5)$, $N\ (-3, -4)$.

Code Your Own

On a coordinate grid, print your initials or those of a friend. Make up a code for the initials using ordered pairs. When you want the person following the code to lift his or her pencil and start a new line, draw a △.

Here is an example.

$(-5, +3)\ (-5, -3)\ \triangle\ (-1, +3)$
$(-1, -3)\ \triangle\ (-5, 0)\ (-1, 0)\ \triangle$
$(+1, +3)\ (+1, -3)\ \triangle\ (+1, +3)$
$(+5, -3)\ \triangle\ (+5, +3)\ (+5, -3)\ \triangle$



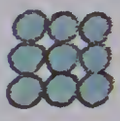
Using Patterns

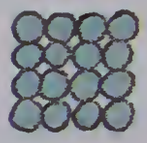
A supermarket manager wants to build a square pyramid with cans of apple juice. The bottom layer is to be 8 cans wide.
How many cans will the display use?

Solution
Work backwards and find a pattern.
Start with the top layer and figure out the pattern.

on the top, 1 can

next layer, 2 cans wide, or 4 cans (2 × 2)

 next layer, 3 cans wide, or 9 cans (3 × 3)

 next layer, 4 cans wide, or 16 cans (4 × 4)

•
•
•

8 layers

The pyramid will use $1 + 4 + 9 + 16 + 25 + 36 + 49 + 64$ or 204 cans.

EXERCISES

Copy each pattern and show the next three numbers or figures.

1. 1, 3, 5, 7, 9, ● ● ●
2. 4, 8, 12, 16, ● ● ●
3. 1, 2, 4, 8, 16, ● ● ●
4. 1, 2, 4, 7, 11, ● ● ●
5. 1, 2, 4, 12, 48, ● ● ●
6. 1, 4, 3, 6, 5, 8, ● ● ●
7.
8. 1, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, ● ● ●
9.
10.

PRACTICE

Solve by using a pattern.

1. A store is ordering sales brochures. The printer charges \$15 for 100 brochures, \$20 for 200, \$25 for 300, and so on. How much will 600 brochures cost?

2. Complete the pattern:
$-10°C, -9°C, -7°C, -4°C, \blacksquare°C.$

3. Pierre made a deal with his parents about his homework. If he does his homework on time, they agree to pay him 1¢ the first day, 2¢ the second day, 4¢ the third day, 7¢ the next day, 11¢ the next day, and so on. If Pierre does his homework on time for 10 days, how much money will he receive altogether?

REVIEW

GR5

Copy and complete the pattern. State the rule.

1. (2, 1) (4, 2) (6, 3) (8, 4) (■, ■) (■, ■)
2. (1, 2) (2, 3) (3, 4) (4, ■) (■, ■) (■, ■)

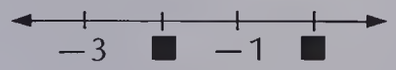
M16

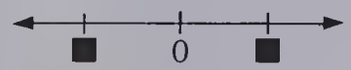
Which temperature is lower?

3. $+2°C$ or $-10°C$
4. $-6°C$ or $-12°C$
5. $-20°C$ or $+5°C$

N21

What are the missing integers?

6. 

7. 

N22

Copy and complete using $>$ or $<$.

8. $+3 \bullet +7$
9. $-2 \bullet -8$
10. $-5 \bullet +4$

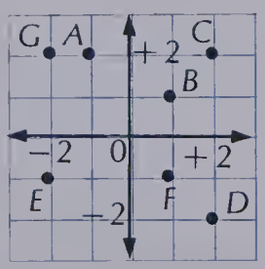
GR6

Name the point located by each ordered pair.

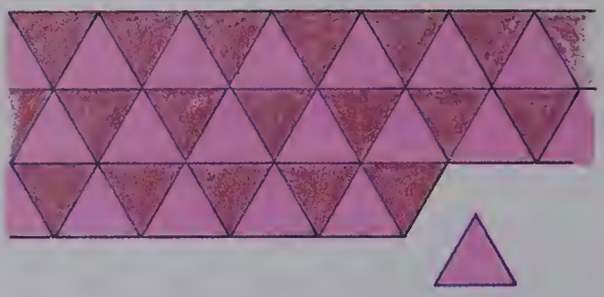
11. $(+1, +1)$
12. $(+2, -2)$

Name the ordered pair.

13. G
14. F



Tiling Patterns

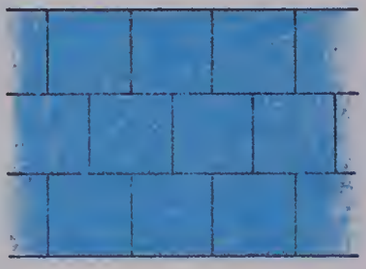


Congruent figures can sometimes cover a surface without gaps or overlapping.

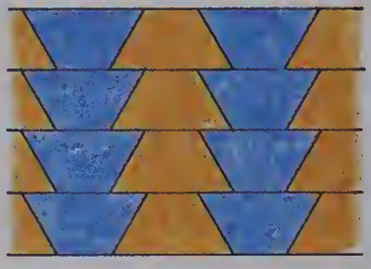
The pattern is called a **tessellation**.

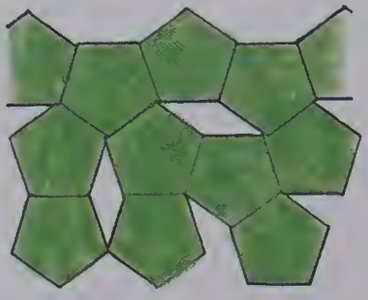
EXERCISES

Will the figure tile a surface?

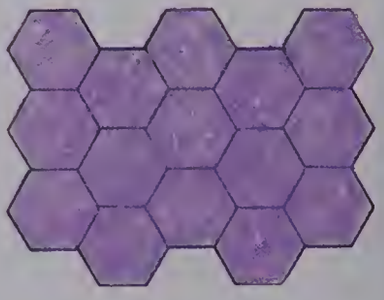
1. 

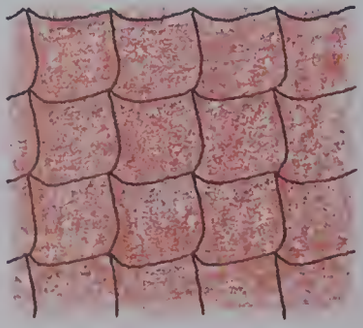
2.

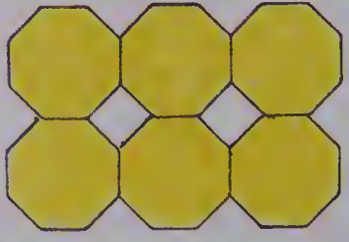
3. 

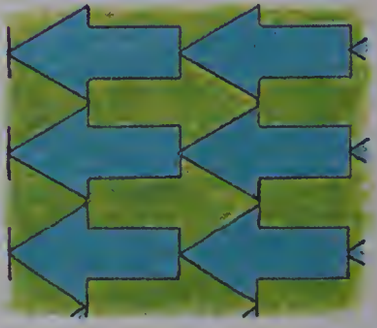
4. 

5.

6. 

7. 

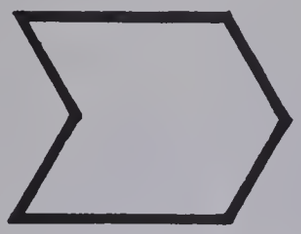
8. 

9. 

PRACTICE

Trace each figure over and over until your page is covered.

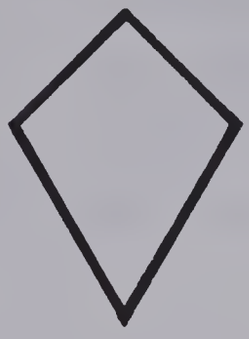
1.

2. 

3.

4.

5.

6. 

How many figures will be in the next pile?

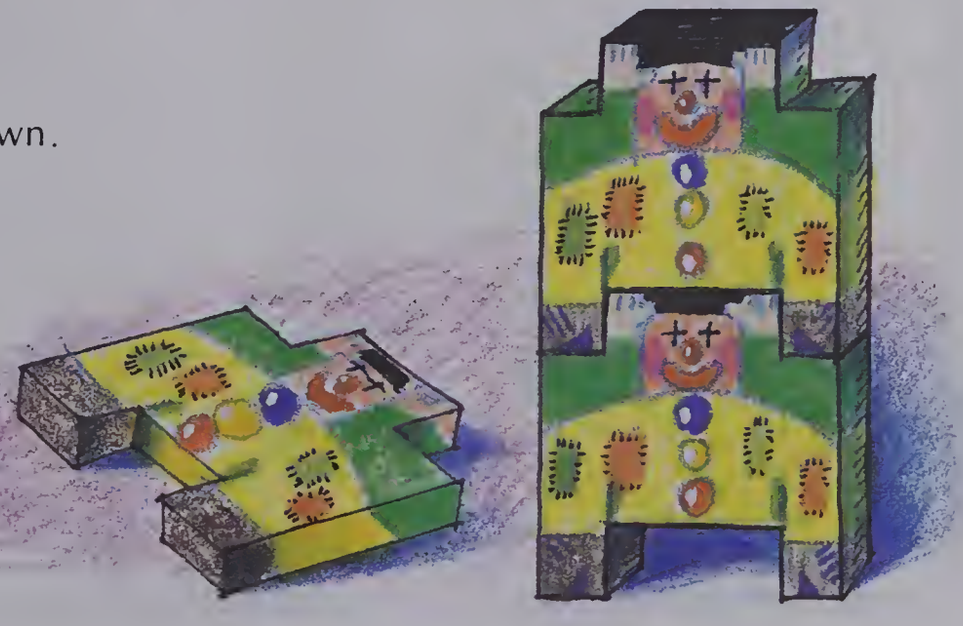
7.

8.

Clowning Around

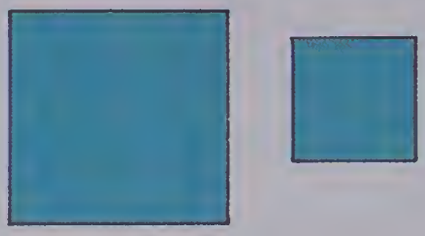
Trace the picture of the clown.

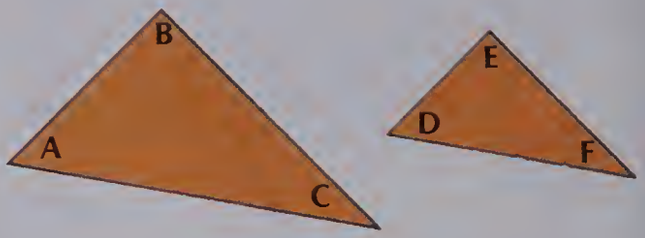
Cover the surface of your page with tracings of the clown.



Similar Figures

Figures that have exactly the same shape (but may be different sizes) are called **similar figures**.





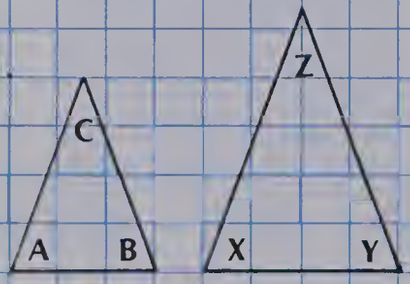
Angle **A** is the same size as angle **D**.
Angle **B** is the same size as angle **E**.
Angle **C** is the same size as angle **F**.

Corresponding angles of similar figures are equal.

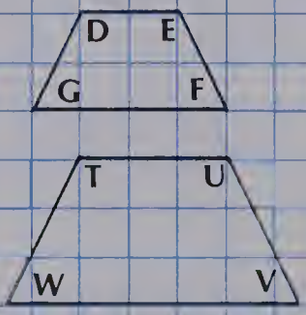
EXERCISES

Name all the pairs of corresponding angles.

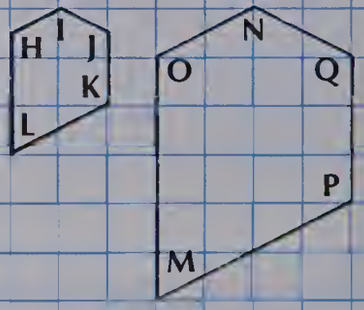
1.



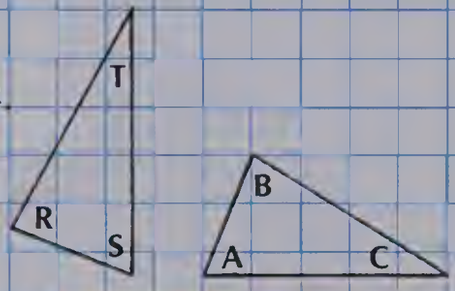
2.



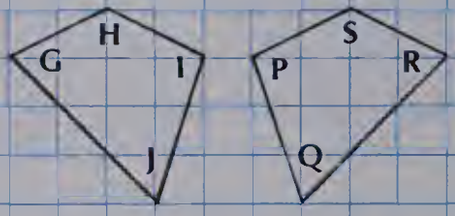
3.



4.

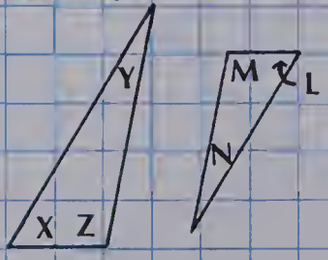


5.

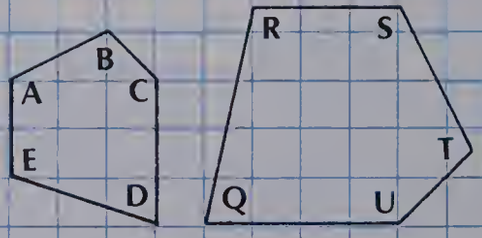


Which angles are equal?

6.



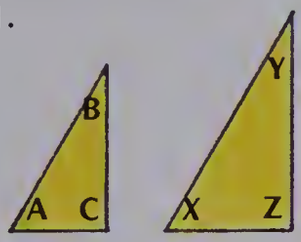
7.



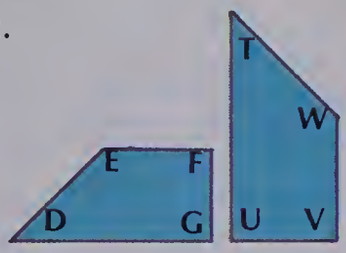
PRACTICE

Name the pairs of corresponding angles in these pairs of similar figures.

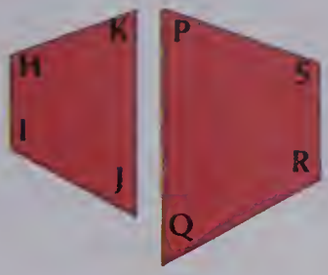
1.



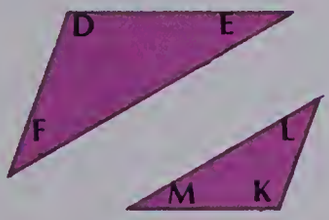
2.



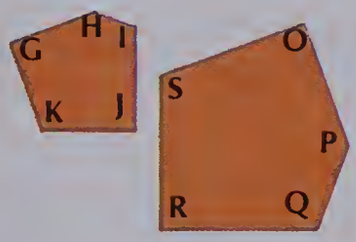
3.



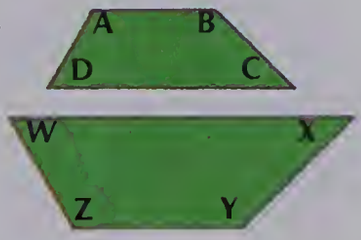
4.



5.

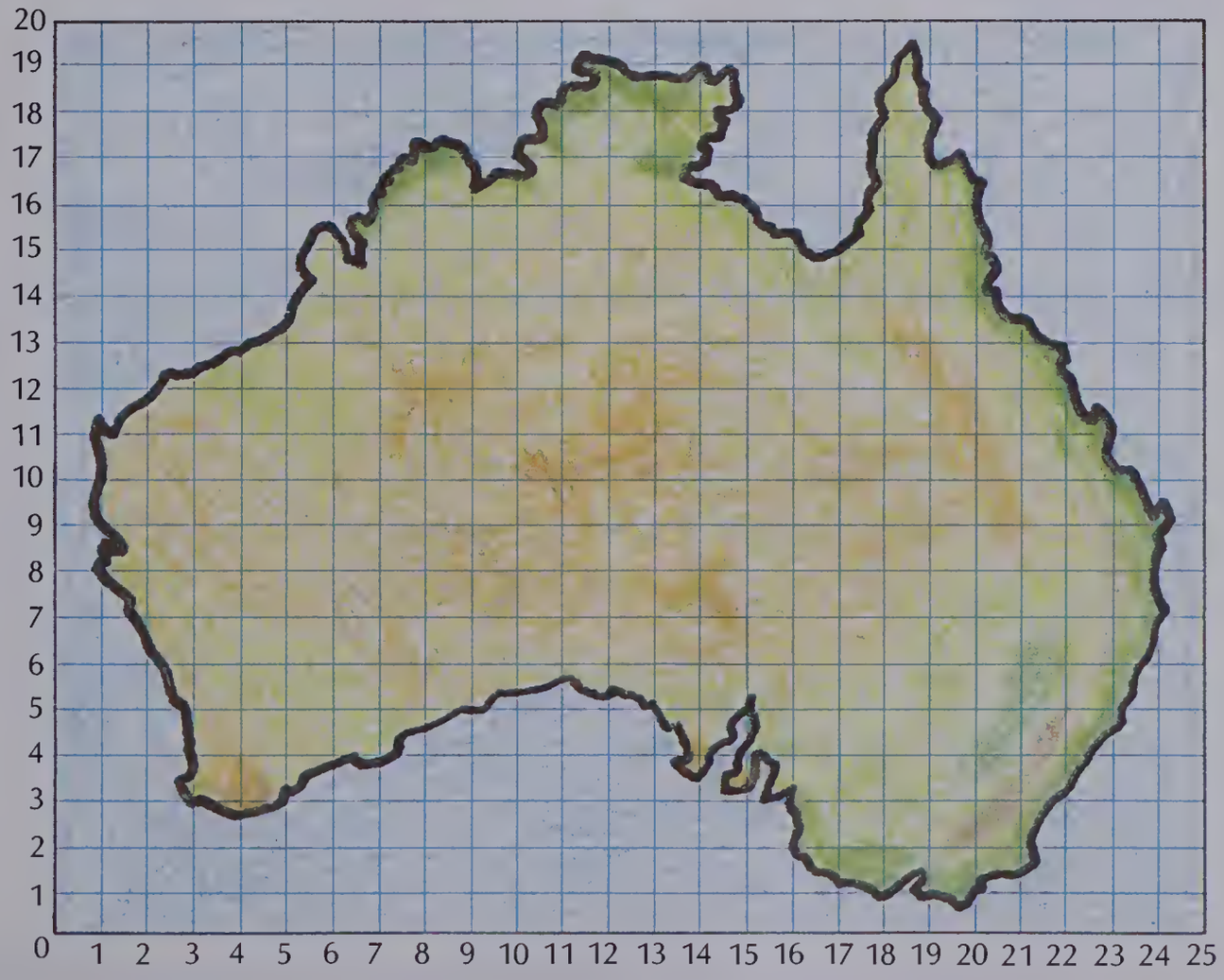


6.



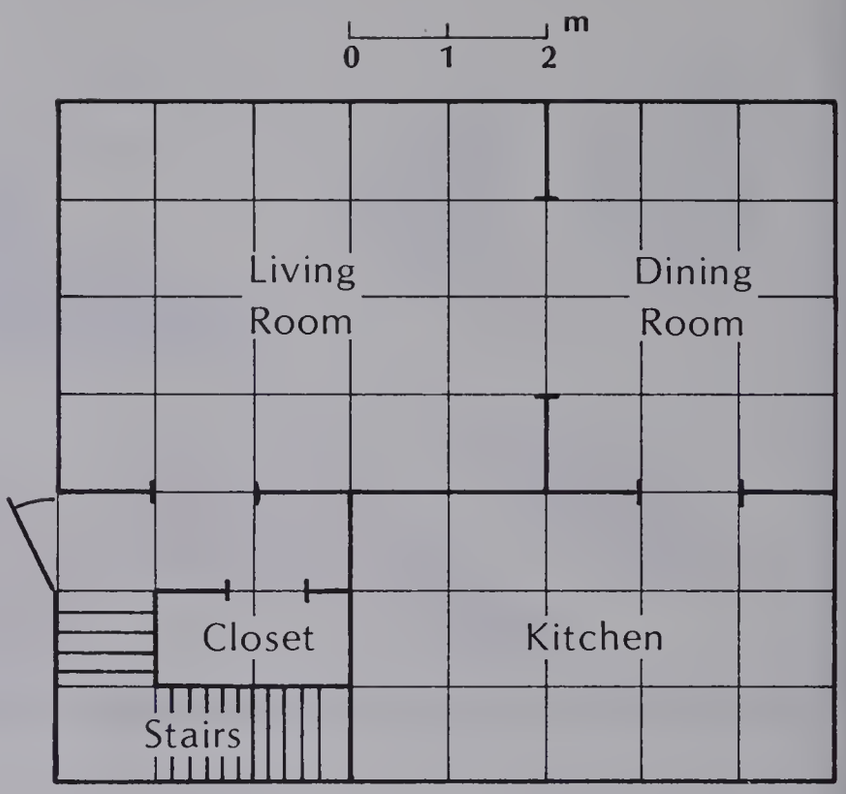
Down Under

Use 1 cm square grid paper to copy the map. What country is it?

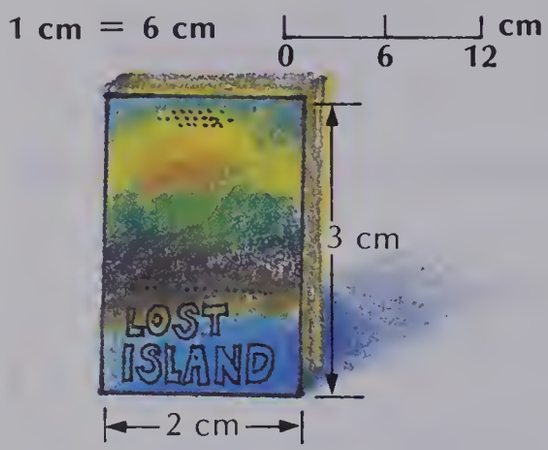


Scale Drawings

This drawing of the first floor of a house uses the **scale 1:100** (one to one hundred). That is, 1 cm on the drawing represents 100 cm (or 1 m) of the real floor. Look at the drawing to see how the scale is shown.



Scale:
1 cm = 6 cm



The drawing of the book uses the scale 1:6. The drawing of the book is 3 cm long. So, the real length of the book is 6×3 cm $= 18$ cm.

EXERCISES

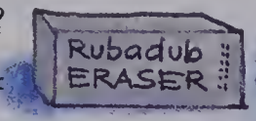
1. The drawing of the dining room is 3 cm wide. How wide is the real dining room?
2. The drawing of the living room is 5 cm long. How long is the real living room?
3. How wide and how long is the drawing of the kitchen?
4. What are the measurements of the real kitchen?
5. How long is the real house? How wide is it?
6. How wide is the drawing of the book?
7. How wide is the real book?
8. How many times bigger are the measurements of the real book?
9. Suppose the scale was 1:7. What would be the measurements of the real book?

PRACTICE

Solve.

The scale is 1:3.

1. How long is the real eraser?
2. How wide is the real box of tissues?



The scale is 1:5.

3. How long is the real pencil?
4. How tall is the real cup?

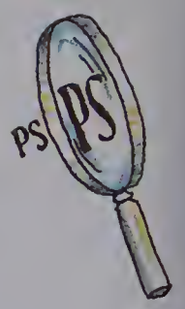
5. A scale is 1:2. How long is the real object if the drawing is 1 cm? 2 cm? 3 cm? 4 cm?
6. A scale is 1:4. How long is the real object if the drawing is 1 mm? 1 cm? 2 cm? 5 cm?
7. Copy and complete.

Scale	Drawing	Real Object
1:10	6 cm	
1:5		25 cm
	2 cm	4 cm

Scaling Down

Helen's back yard is 30 m long and 20 m wide. She wants to make a map of it that will fit in this rectangle. What scale should she use? What will the length and width of her map be?

Two-Step and Three-Step Problems



Rita had prints made of pictures taken at a class outing. Each print cost her 67¢. She had 35 prints made and sold them to classmates at 75¢ each.
How much money did she make?

Solution A

Step 1: Cost of 35 prints at 67¢ each.
$35 \times \$0.67 = \$23.45$

Step 2: Selling price of 35 prints at 75¢ each.
$35 \times \$0.75 = \$26.25$

Step 3: Profit $= \$26.25 - \$23.45$
$= \$2.80$

Rita made $2.80 profit.

Solution B

Step 1: Profit on each print.
$\$0.75 - \$0.67 = \$0.08$

Step 2: Profit on 35 prints.
$35 \times \$0.08 = \$2.80$

EXERCISES

Complete the steps in solving the problem.

1. Jacob bought 2 packs of paper at 89¢ each and a notebook for $2.95. What was the total cost?
   Step 1: Cost of paper: $2 \times \$0.89 =$ ■
   Step 2: Total cost: $\$2.95 +$ ■ $=$ ■

2. A section of an auditorium has 11 rows with 12 seats in each row. The tickets for the seats in this section cost $5. If the section is filled, how much money is taken in?
   Step 1: Total number of seats: $11 \times 12 =$ ■
   Step 2: Money taken in: ■ $\times \$5 =$ ■

3. A wall of a building measures 30 m by 6 m. One can of paint costs $21.95 and will cover 60 m^2. How much will it cost to paint the wall?
   Step 1: Area of the wall: ■
   Step 2: Number of cans of paint needed: ■
   Step 3: Cost of paint: ■

PRACTICE

Solve.

1. George and Jenny budgeted $1500 for a vacation. They plan to spend $378 on lodging, $225 on food, and $769 on transportation. How much money will be left for other items?
2. A daily interest savings account with $10 000 in it earned $4.11 a day for the first 9 days of June. The interest rate went up and it earned $4.25 a day for the next 21 days. How much interest did the account earn in June?
3. Chang had 3 h to do as he pleased. He read for an hour, dozed for 20 min, talked to a friend for 20 min, and played tennis for 40 min. How much time did he have left?
4. Tony mowed lawns for 3 h and was paid $2/h. He cleaned a basement in 2.5 h and was paid $2.50/h. How much money did he earn?
5. Christine babysits for $1.50/h. She can usually babysit 6 h/week. How many weeks will it take her to earn $50?

REVIEW

G11

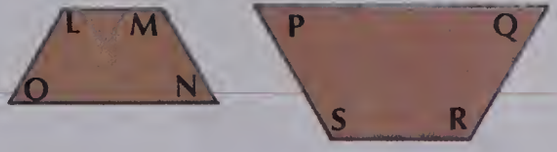
1. Which figure could be used to tile a surface?

G12

Name pairs of corresponding angles in the similar polygons.

2.

3.



G13

Solve.

4. A drawing is 3 cm long. The scale is 1:4. How long is the real object?
5. A drawing is 5 cm wide. The scale is 1:3. How wide is the real object?

TEST UNIT 13

Copy and complete the pattern. State the rule.

1. (0, 3) (1, 4) (2, 5) (3, 6) (■, ■) (■, ■)
2. (3, 1) (6, 2) (9, 3) (12, 4) (■, ■) (■, ■)

Which temperature is lower?

3. $+8°C$ or $+18°C$
4. $+2°C$ or $-1°C$
5. $-10°C$ or $-5°C$

Copy. Fill in the missing numbers.

6. ■ $+5$ ■

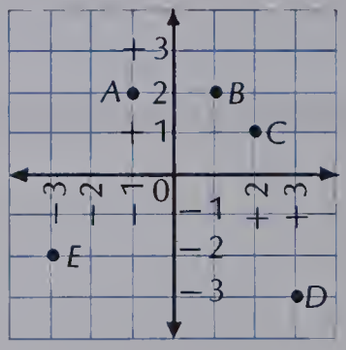
7. -3 ■ -1 ■

Copy and complete using $>$ or $<$.

8. $+6$ ● $+10$
9. $+2$ ● -7
10. -10 ● -5

Name the point located by the ordered pair.

11. $(+3, -3)$
12. $(-1, +2)$



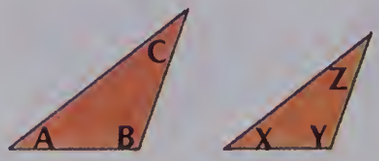
Write the ordered pair for each.

13. C
14. *E*

15. Which figures would tile a surface?

Which angles are equal in the similar figures?

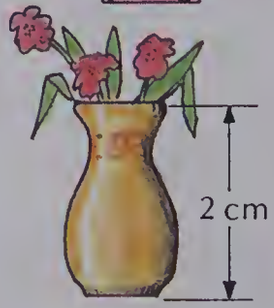
16.



17.

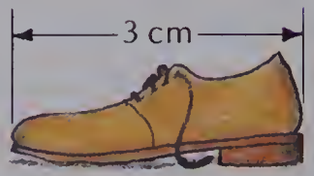
Solve.

18. How tall is the real vase?



Scale: 1:10

19. How long is the real shoe?



Scale: 1:7

LOOKING BACK

GEOMETRY

Find the figure congruent to **A**.

1.

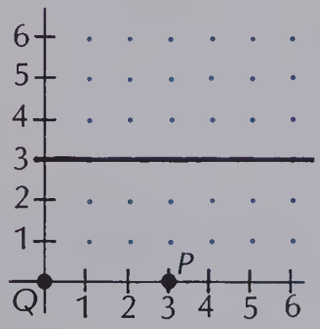
2.

3.

4.

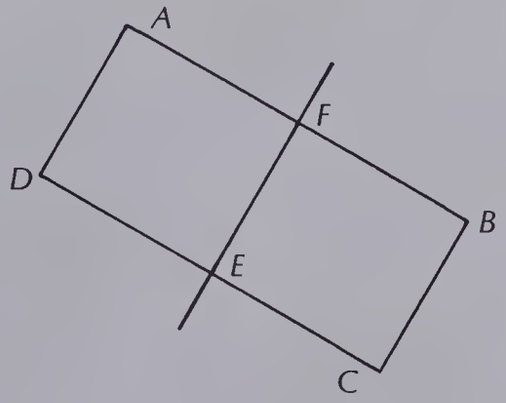
Name the coordinates of the image of point *P*.

5. After a slide of 3 right and up 5.
6. After a flip over the line.
7. After a quarter turn counterclockwise about Q.



In the figure to the right:

8. name all the parallel segments.
9. name all the perpendicular segments.

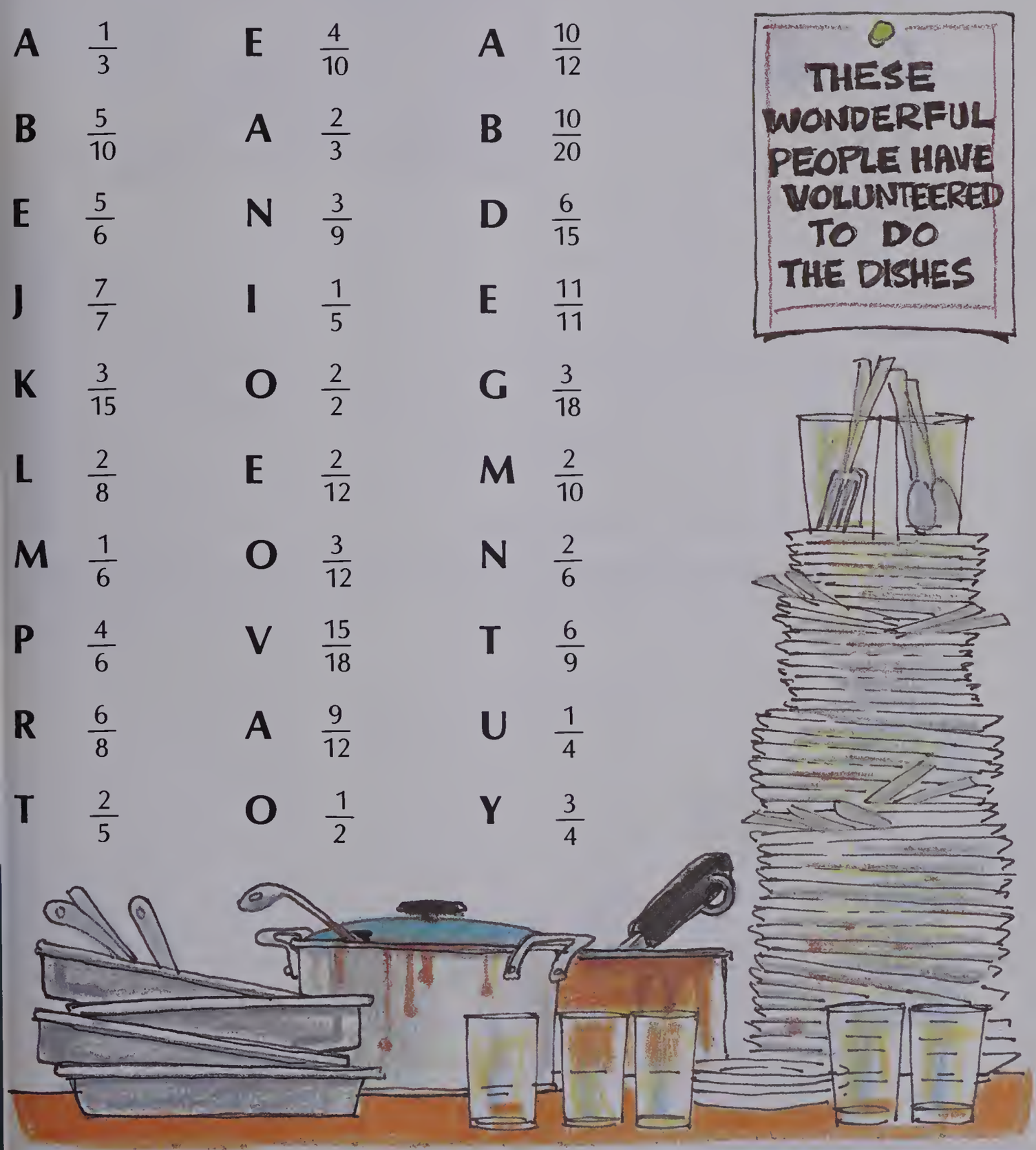


UNIT 14
ADDITION & SUBTRACTION OF FRACTIONS

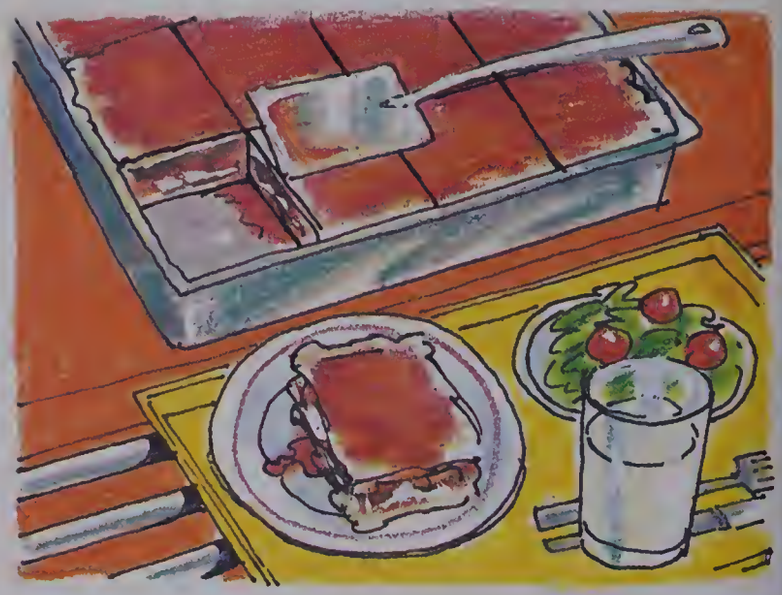
Matchmaker

Match the equivalent fractions from the three columns.
The letters of each set spell a name.

A	$\frac{1}{3}$	E	$\frac{4}{10}$	A	$\frac{10}{12}$
B	$\frac{5}{10}$	A	$\frac{2}{3}$	B	$\frac{10}{20}$
E	$\frac{5}{6}$	N	$\frac{3}{9}$	D	$\frac{6}{15}$
J	$\frac{7}{7}$	I	$\frac{1}{5}$	E	$\frac{11}{11}$
K	$\frac{3}{15}$	O	$\frac{2}{2}$	G	$\frac{3}{18}$
L	$\frac{2}{8}$	E	$\frac{2}{12}$	M	$\frac{2}{10}$
M	$\frac{1}{6}$	O	$\frac{3}{12}$	N	$\frac{2}{6}$
P	$\frac{4}{6}$	V	$\frac{15}{18}$	T	$\frac{6}{9}$
R	$\frac{6}{8}$	A	$\frac{9}{12}$	U	$\frac{1}{4}$
T	$\frac{2}{5}$	O	$\frac{1}{2}$	Y	$\frac{3}{4}$



Adding Fractions



In the school cafeteria, Mrs. Kates cut each pan of lasagna into 24 pieces. She served 8 pieces to the first group of students and 10 pieces to the next group. What fraction of the first pan of lasagna was served?

$$\frac{8}{24} + \frac{10}{24} = \frac{18}{24}$$

But $\frac{18}{24}$ can be written in simpler terms. $\frac{18}{24} = \frac{18 \div 6}{24 \div 6} = \frac{3}{4}$

$\frac{3}{4}$ of the first pan of lasagna was served.

EXERCISES

Add.

1. 1 fourth + 2 fourths = ■ fourths
2. 3 fifths + 1 fifth = ■ fifths
3. 2 eights + 5 eights = ■ eighths

Add. Write the sum in simplest terms.

4. $\frac{1}{3} + \frac{1}{3}$
5. $\frac{1}{5} + \frac{3}{5}$
6. $\frac{3}{8} + \frac{4}{8}$
7. $\frac{2}{6} + \frac{3}{6}$
8. $\frac{1}{4} + \frac{1}{4}$
9. $\frac{3}{8} + \frac{1}{8}$
10. $\frac{1}{6} + \frac{1}{6}$
11. $\frac{3}{10} + \frac{1}{10}$
12. $\frac{4}{5} + \frac{1}{5}$
13. $\frac{5}{8} + \frac{4}{8}$
14. $\frac{5}{6} + \frac{4}{6}$
15. $\frac{3}{4} + \frac{3}{4}$
16. $\frac{2}{18} + \frac{4}{18}$
17. $\frac{5}{12} + \frac{7}{12}$
18. $\frac{11}{15} + \frac{9}{15}$
19. $\frac{11}{20} + \frac{4}{20}$
20. $\frac{5}{24} + \frac{7}{24}$
21. $\frac{20}{25} + \frac{10}{25}$
22. $\frac{1}{50} + \frac{4}{50}$
23. $\frac{8}{100} + \frac{2}{100}$

PRACTICE

Add. Write the sum in simplest terms.

1. $\frac{3}{8} + \frac{4}{8}$
2. $\frac{2}{9} + \frac{5}{9}$
3. $\frac{2}{6} + \frac{4}{6}$
4. $\frac{6}{10} + \frac{2}{10}$
5. $\frac{7}{12} + \frac{2}{12}$
6. $\frac{6}{10} + \frac{2}{10}$
7. $\frac{7}{10} + \frac{3}{10}$
8. $\frac{8}{10} + \frac{4}{10}$
9. $\frac{9}{10} + \frac{6}{10}$
10. $\frac{8}{10} + \frac{9}{10}$
11. $\frac{3}{12} + \frac{3}{12}$
12. $\frac{8}{25} + \frac{7}{25}$
13. $\frac{2}{6} + \frac{3}{6}$
14. $\frac{3}{5} + \frac{3}{5}$
15. $\frac{4}{8} + \frac{6}{8}$
16. $\frac{13}{20} + \frac{12}{20}$

Solve.

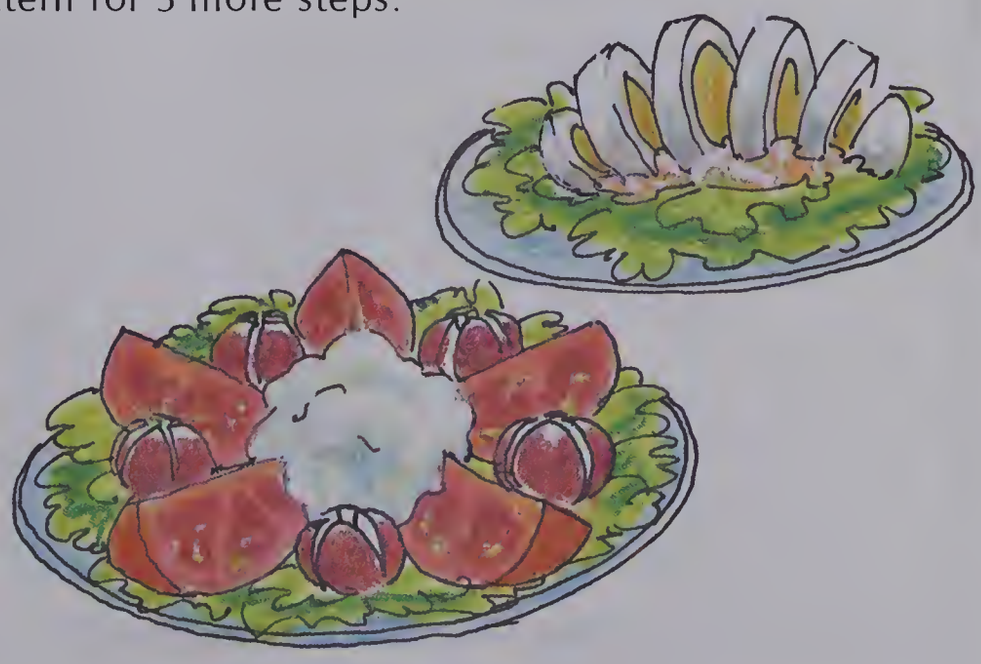
17. Twenty students in Room 106 stayed for lunch. Eight of them ate red apples and six of them ate yellow apples. What fraction of the students ate apples for lunch?

18. Mr. Lawes hard boiled a dozen eggs. Ben ate 2 and Anna ate 1.
    a. What fraction of the eggs did Ben and Anna eat?
    b. What fraction of the eggs is left?

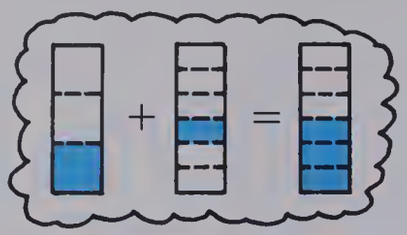
Fraction Patterns

Continue each fraction pattern for 3 more steps.

1. $\frac{1}{10}, \frac{2}{10}, \frac{3}{10}, \frac{4}{10}, \bullet\bullet\bullet$
2. $\frac{1}{12}, \frac{3}{12}, \frac{5}{12}, \frac{7}{12}, \bullet\bullet\bullet$
3. $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \bullet\bullet\bullet$
4. $\frac{1}{2}, 1, 1\frac{1}{2}, 2, \bullet\bullet\bullet$
5. $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \bullet\bullet\bullet$
6. $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \bullet\bullet\bullet$



Different Denominators



You can add $\frac{1}{3}$ and $\frac{1}{6}$ even though the denominators are different.

Rewrite a fraction so the denominators are the same.

Add.

Simplify.

$$\begin{array}{r} \frac{1}{3} \\ +\ \frac{1}{6} \\ \hline \end{array} \quad \begin{array}{r} \frac{2}{6} \\ +\ \frac{1}{6} \\ \hline \end{array} \quad \begin{array}{r} \frac{2}{6} \\ +\ \frac{1}{6} \\ \hline \frac{3}{6} \end{array} \quad \frac{3}{6} = \frac{1}{2}$$

So, $\frac{1}{3} + \frac{1}{6} = \frac{1}{2}$

6 is a **common denominator** for $\frac{1}{3}$ and $\frac{1}{6}$.

EXERCISES

Copy and complete.

1.
$$\begin{array}{r} \frac{1}{2} \\ +\ \frac{3}{8} \\ \hline \end{array} \quad \begin{array}{r} \blacksquare{}{8} \\ +\ \frac{3}{8} \\ \hline \blacksquare{}{8} \end{array}$$

2.
$$\begin{array}{r} \frac{3}{10} \\ +\ \frac{2}{5} \\ \hline \end{array} \quad \begin{array}{r} \frac{3}{10} \\ +\ \blacksquare{}{10} \\ \hline \blacksquare{}{10} \end{array}$$

3.
$$\begin{array}{r} \frac{1}{12} \\ +\ \frac{2}{3} \\ \hline \end{array} \quad \begin{array}{r} \frac{1}{12} \\ +\ \blacksquare{}{12} \\ \hline \blacksquare{}{12} \end{array}$$

Add. Write the sum in simplest terms.

4. $\begin{array}{r} \frac{1}{8} \\ +\ \frac{1}{4} \\ \hline \end{array}$ **5.** $\begin{array}{r} \frac{2}{3} \\ +\ \frac{1}{6} \\ \hline \end{array}$ **6.** $\begin{array}{r} \frac{3}{5} \\ +\ \frac{1}{10} \\ \hline \end{array}$ **7.** $\begin{array}{r} \frac{1}{4} \\ +\ \frac{3}{8} \\ \hline \end{array}$ **8.** $\begin{array}{r} \frac{2}{9} \\ +\ \frac{1}{3} \\ \hline \end{array}$

9. $\frac{1}{2} + \frac{2}{8}$ **10.** $\frac{1}{12} + \frac{1}{4}$ **11.** $\frac{1}{2} + \frac{3}{10}$ **12.** $\frac{2}{5} + \frac{7}{10}$

13. $\frac{1}{6} + \frac{5}{12}$ **14.** $\frac{7}{8} + \frac{3}{4}$ **15.** $\frac{9}{10} + \frac{2}{5}$ **16.** $\frac{3}{4} + \frac{1}{2}$

17. $\frac{3}{8} + \frac{2}{16}$ **18.** $\frac{1}{3} + \frac{4}{6}$ **19.** $\frac{2}{7} + \frac{6}{14}$ **20.** $\frac{6}{10} + \frac{1}{5}$

PRACTICE

Add. Simplify the sum.

1. $\begin{array}{r} \frac{3}{5} \\ +\frac{3}{10} \\ \hline \end{array}$ **2.** $\begin{array}{r} \frac{7}{8} \\ +\frac{3}{4} \\ \hline \end{array}$ **3.** $\begin{array}{r} \frac{1}{3} \\ +\frac{4}{9} \\ \hline \end{array}$ **4.** $\begin{array}{r} \frac{5}{6} \\ +\frac{2}{3} \\ \hline \end{array}$ **5.** $\begin{array}{r} \frac{5}{12} \\ +\frac{2}{3} \\ \hline \end{array}$

6. $\frac{3}{4} + \frac{1}{12}$ **7.** $\frac{2}{3} + \frac{5}{9}$ **8.** $\frac{1}{9} + \frac{2}{3}$ **9.** $\frac{7}{8} + \frac{1}{2}$

10. $\frac{4}{5} + \frac{1}{10}$ **11.** $\frac{3}{10} + \frac{1}{2}$ **12.** $\frac{1}{12} + \frac{3}{4}$ **13.** $\frac{7}{10} + \frac{4}{5}$

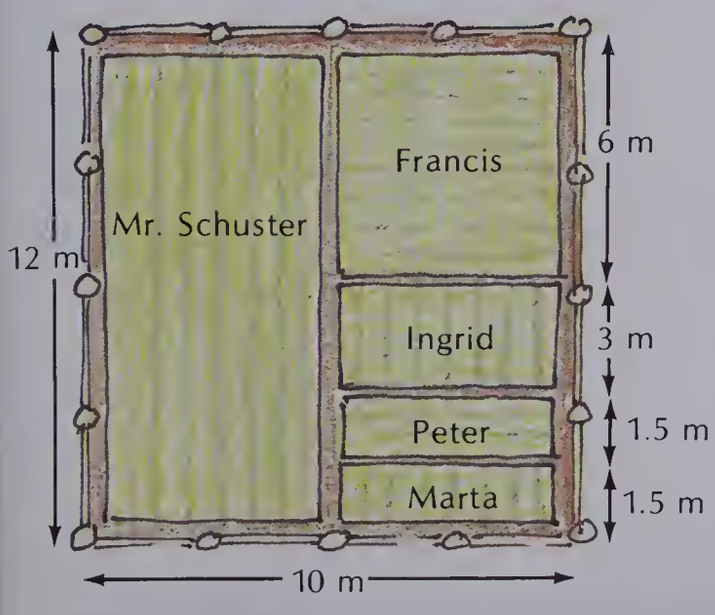
14. $\frac{3}{12} + \frac{1}{3}$ **15.** $\frac{7}{12} + \frac{2}{3}$ **16.** $\frac{7}{20} + \frac{1}{10}$ **17.** $\frac{3}{25} + \frac{2}{5}$

Solve.

18. The Actons estimated that they used $\frac{1}{4}$ of a box of cereal one week and $\frac{1}{2}$ the next. About how much of the box of cereal was gone?

19. Nina has \$1.50 for lunch money. She spent 50¢ for a sandwich and 25¢ for milk.
What fraction of her lunch money did she spend for the sandwich? for the milk? for the sandwich and milk together?

Garden Patches



a. Mr. Schuster tends $\frac{1}{2}$ of the garden.
What fraction does Francis tend? Ingrid? Peter? Marta?

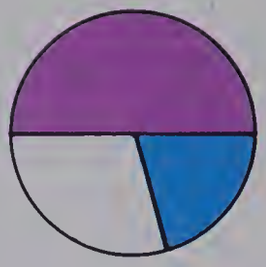
b. What fraction of the garden do Francis and Ingrid tend together?

c. What fraction of the garden do Francis, Ingrid, and Peter tend together?

d. What fraction of the garden do Mr. Schuster, Peter, and Marta tend together?

Different Denominators

Sometimes both fractions must be rewritten before they can be added. Find the **least common denominator**.



$\frac{1}{2} + \frac{1}{5}$

multiples of 2: 2, 4, 6, 8, (10)
multiples of 5: 5, (10)

10 is the least common denominator (LCD).

Rewrite the fractions. Add.

$$\begin{array}{r} \frac{1}{2} \\ +\ \frac{1}{5} \\ \hline \end{array} \quad \rightarrow \quad \begin{array}{r} \frac{5}{10} \\ +\ \frac{2}{10} \\ \hline \end{array} \quad \rightarrow \quad \begin{array}{r} \frac{5}{10} \\ +\ \frac{2}{10} \\ \hline \frac{7}{10} \end{array}$$

Then simplify the answer if possible.

EXERCISES

Find the least common multiple of each pair of numbers.

1. 4, 8	**2.** 3, 9	**3.** 2, 6	**4.** 4, 12
5. 6, 9	**6.** 4, 6	**7.** 6, 8	**8.** 4, 5
9. 2, 10	**10.** 5, 6	**11.** 3, 5	**12.** 10, 12

Copy and complete.

13. $\begin{array}{r} \frac{1}{3} \\ +\ \frac{2}{5} \\ \hline \end{array} \rightarrow \begin{array}{r} \frac{\blacksquare}{15} \\ +\ \frac{\blacksquare}{15} \\ \hline \frac{\blacksquare}{15} \end{array}$

14. $\begin{array}{r} \frac{3}{4} \\ +\ \frac{1}{6} \\ \hline \end{array} \rightarrow \begin{array}{r} \frac{\blacksquare}{12} \\ +\ \frac{\blacksquare}{12} \\ \hline \frac{\blacksquare}{12} \end{array}$

15. $\begin{array}{r} \frac{2}{5} \\ +\ \frac{1}{4} \\ \hline \end{array} \rightarrow \begin{array}{r} \frac{8}{\blacksquare} \\ +\ \frac{5}{\blacksquare} \\ \hline \frac{13}{\blacksquare} \end{array}$

Add. Write the sum in simplest terms.

16. $\begin{array}{r} \frac{1}{2} \\ +\ \frac{3}{7} \\ \hline \end{array}$ **17.** $\begin{array}{r} \frac{3}{8} \\ +\ \frac{1}{6} \\ \hline \end{array}$ **18.** $\begin{array}{r} \frac{1}{6} \\ +\ \frac{1}{2} \\ \hline \end{array}$ **19.** $\begin{array}{r} \frac{1}{3} \\ +\ \frac{3}{8} \\ \hline \end{array}$ **20.** $\begin{array}{r} \frac{3}{10} \\ +\ \frac{2}{5} \\ \hline \end{array}$

21. $\frac{2}{3} + \frac{1}{4}$ **22.** $\frac{1}{6} + \frac{4}{5}$ **23.** $\frac{3}{4} + \frac{3}{10}$ **24.** $\frac{1}{2} + \frac{7}{10}$

PRACTICE

Add. Write the sum in simplest terms.

1. $\begin{array}{r} \frac{3}{8} \\ +\frac{1}{6} \\ \hline \end{array}$ **2.** $\begin{array}{r} \frac{1}{5} \\ +\frac{2}{3} \\ \hline \end{array}$ **3.** $\begin{array}{r} \frac{3}{7} \\ +\frac{1}{2} \\ \hline \end{array}$ **4.** $\begin{array}{r} \frac{1}{6} \\ +\frac{2}{5} \\ \hline \end{array}$

5. $\frac{5}{6} + \frac{1}{8}$ **6.** $\frac{3}{8} + \frac{2}{3}$ **7.** $\frac{7}{10} + \frac{1}{6}$ **8.** $\frac{3}{8} + \frac{5}{6}$

9. $\frac{4}{9} + \frac{1}{4}$ **10.** $\frac{3}{8} + \frac{1}{12}$ **11.** $\frac{7}{8} + \frac{2}{3}$ **12.** $\frac{5}{9} + \frac{1}{6}$

Solve.

13. Ellen and her friends ordered two large pizzas. After they finished eating, $\frac{1}{4}$ of one pizza and $\frac{1}{6}$ of the other were left. How much pizza was left?

14. Vigo has a bag of cherries. He wants to keep $\frac{1}{2}$ of the cherries himself and give $\frac{1}{3}$ to his sister and $\frac{1}{6}$ to his brother. Can he do this? Will there be any left over?

Working Backwards

Copy and fill in the missing numbers.

a. $\begin{array}{r} \frac{\blacksquare}{4} \\ +\frac{2}{3} \\ \hline \end{array}$ → $\begin{array}{r} \frac{\blacksquare}{12} \\ +\frac{8}{12} \\ \hline \frac{11}{12} \end{array}$

b. $\begin{array}{r} \frac{\blacksquare}{5} \\ +\frac{1}{\blacksquare} \\ \hline \end{array}$ → $\begin{array}{r} \frac{\blacksquare}{10} \\ +\frac{5}{10} \\ \hline \frac{9}{10} \end{array}$

c. $\begin{array}{r} \frac{\blacksquare}{\blacksquare} \\ +\frac{2}{3} \\ \hline \end{array}$ → $\begin{array}{r} \frac{\blacksquare}{\blacksquare} \\ +\frac{10}{15} \\ \hline \frac{22}{15} \end{array}$

d. $\begin{array}{r} \frac{3}{\blacksquare} \\ +\frac{\blacksquare}{6} \\ \hline \end{array}$ → $\begin{array}{r} \frac{\blacksquare}{12} \\ +\frac{\blacksquare}{12} \\ \hline \frac{19}{12} \end{array}$

Adding Mixed Numerals

In the cafeteria, Grade 7 needs $3\frac{1}{2}$ tables and Grade 6 needs $3\frac{1}{4}$ tables.

How many tables do Grades 6 and 7 need?

$$3\frac{1}{2} + 3\frac{1}{4}$$

Rewrite with the LCD.

$$3\frac{2}{4} + 3\frac{1}{4}$$

Add.

$$3\frac{2}{4} + 3\frac{1}{4} = 6\frac{3}{4}$$

Sometimes it is necessary to regroup to simplify the answer.

$\frac{5}{4} = 1\frac{1}{4}$

$$3\frac{1}{2} + 2\frac{3}{4}$$

Rewrite with the LCD.

$$3\frac{2}{4} + 2\frac{3}{4}$$

Add.

$$3\frac{2}{4} + 2\frac{3}{4} = 5\frac{5}{4}$$

Regroup.

$$5\frac{5}{4} = 5 + 1\frac{1}{4} = 6\frac{1}{4}$$

EXERCISES

Add. Write the answer in simplest terms.

1. $2\frac{1}{3} + 4\frac{1}{3}$ **2.** $4\frac{3}{8} + 1\frac{1}{8}$ **3.** $10\frac{3}{7} + 8\frac{1}{7}$ **4.** $2\frac{2}{5} + \frac{2}{5}$ **5.** $1\frac{2}{9} + 13\frac{5}{9}$

6. $1\frac{1}{2} + 2\frac{1}{3}$ **7.** $6\frac{2}{5} + 2\frac{1}{4}$ **8.** $3\frac{1}{4} + 4\frac{1}{2}$ **9.** $6\frac{1}{6} + 5\frac{3}{8}$ **10.** $12\frac{3}{10} + \frac{1}{2}$

11. $4\frac{3}{4} + 3\frac{2}{3}$ **12.** $5\frac{5}{6} + 1\frac{1}{2}$ **13.** $2\frac{7}{10} + 8\frac{2}{5}$ **14.** $11\frac{1}{2} + 2\frac{5}{8}$

PRACTICE

Add. Write the sum in simplest form.

1. $4\frac{2}{5} + 2\frac{1}{2}$

2. $3\frac{2}{7} + 5\frac{3}{7}$

3. $1\frac{1}{4} + 9\frac{5}{6}$

4. $6\frac{2}{5} + 8\frac{7}{10}$

5. $7\frac{2}{9} + 3\frac{1}{4}$

6. $3\frac{1}{2} + \frac{1}{6}$

7. $7\frac{2}{3} + 14\frac{5}{6}$

8. $5\frac{3}{4} + 2\frac{1}{8}$

9. $12\frac{1}{4} + 6\frac{8}{9}$

10. $1\frac{1}{2} + 6\frac{2}{5}$

11. $3\frac{2}{3} + 4\frac{2}{9}$

12. $12\frac{1}{12} + 8\frac{1}{4}$

13. $5\frac{1}{3} + 7\frac{4}{5}$

Solve.

14. Renata baked $4\frac{3}{4}$ dozen cookies and Bill baked $3\frac{2}{3}$ dozen.

   a. How many dozen cookies did they make in all?

   b. How many cookies did they make?

REVIEW

Add. Write the sum in simplest terms.

A61

1. $\frac{5}{6} + \frac{1}{6}$

2. $\frac{2}{3} + \frac{2}{3}$

3. $\frac{3}{10} + \frac{1}{10}$

A62

4. $\frac{1}{9} + \frac{1}{3}$

5. $\frac{5}{12} + \frac{1}{2}$

6. $\frac{3}{10} + \frac{2}{5}$

A63

7. $\frac{2}{3} + \frac{1}{8}$

8. $\frac{3}{8} + \frac{5}{6}$

9. $\frac{2}{3} + \frac{1}{10}$

A64

10. $3\frac{1}{3} + 2\frac{1}{4}$

11. $15\frac{3}{5} + 11\frac{3}{5}$

12. $21\frac{7}{10} + 8\frac{3}{4}$

Subtracting Fractions

Rewrite a fraction using LCD. Subtract. Simplify.

$$\frac{5}{6} - \frac{1}{2} \quad \frac{5}{6} - \frac{3}{6} \quad \frac{5}{6} - \frac{3}{6} = \frac{2}{6} \quad \frac{2}{6} = \frac{1}{3}$$

So, $\frac{5}{6} - \frac{1}{2} = \frac{1}{3}$

$$\frac{5}{6} - \frac{4}{6} = \frac{1}{6}$$

EXERCISES

Subtract.

1. 7 eighths − 6 eighths = ■ eighths
2. 11 twelfths − 4 twelfths = ■ twelfths
3. 9 tenths − 6 tenths = ■ tenths

Subtract. Write the difference in simplest terms.

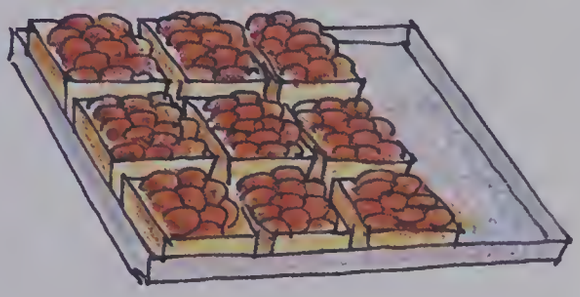
4. $\frac{2}{3} - \frac{1}{3}$
5. $\frac{3}{4} - \frac{1}{4}$
6. $\frac{4}{6} - \frac{1}{6}$
7. $\frac{5}{8} - \frac{2}{8}$
8. $\frac{9}{10} - \frac{1}{10}$
9. $\frac{5}{7} - \frac{2}{7}$
10. $\frac{7}{12} - \frac{1}{12}$
11. $\frac{8}{9} - \frac{3}{9}$
12. $\frac{7}{10} - \frac{1}{2}$ $\quad \frac{7}{10} - \frac{■}{10} = \frac{■}{10}$
13. $\frac{10}{12} - \frac{1}{6}$ $\quad \frac{10}{12} - \frac{■}{12} = \frac{■}{12}$ $\quad \frac{■}{12} = \frac{■}{■}$
14. $\frac{1}{5} - \frac{1}{10}$
15. $\frac{7}{12} - \frac{1}{3}$
16. $\frac{2}{3} - \frac{2}{9}$
17. $\frac{3}{4} - \frac{3}{8}$
18. $\frac{16}{20} - \frac{3}{10}$

PRACTICE

Subtract. Write the difference in simplest terms.

1. $\frac{2}{4} - \frac{1}{4}$	**2.** $\frac{4}{5} - \frac{2}{5}$	**3.** $\frac{6}{7} - \frac{3}{7}$	**4.** $\frac{5}{9} - \frac{1}{9}$
5. $\frac{11}{12} - \frac{5}{12}$	**6.** $\frac{7}{10} - \frac{3}{10}$	**7.** $\frac{7}{8} - \frac{3}{8}$	**8.** $\frac{15}{100} - \frac{5}{100}$
9. $\frac{4}{5} - \frac{7}{10}$	**10.** $\frac{5}{7} - \frac{3}{14}$	**11.** $\frac{5}{6} - \frac{1}{3}$	**12.** $\frac{7}{10} - \frac{2}{5}$
13. $\frac{11}{12} - \frac{2}{3}$	**14.** $\frac{5}{8} - \frac{1}{4}$	**15.** $\frac{5}{6} - \frac{5}{12}$	**16.** $\frac{20}{25} - \frac{3}{5}$
17. $\frac{3}{4} - \frac{5}{16}$	**18.** $\frac{7}{20} - \frac{1}{10}$	**19.** $\frac{9}{10} - \frac{3}{10}$	**20.** $\frac{5}{8} - \frac{5}{10}$

Solve.

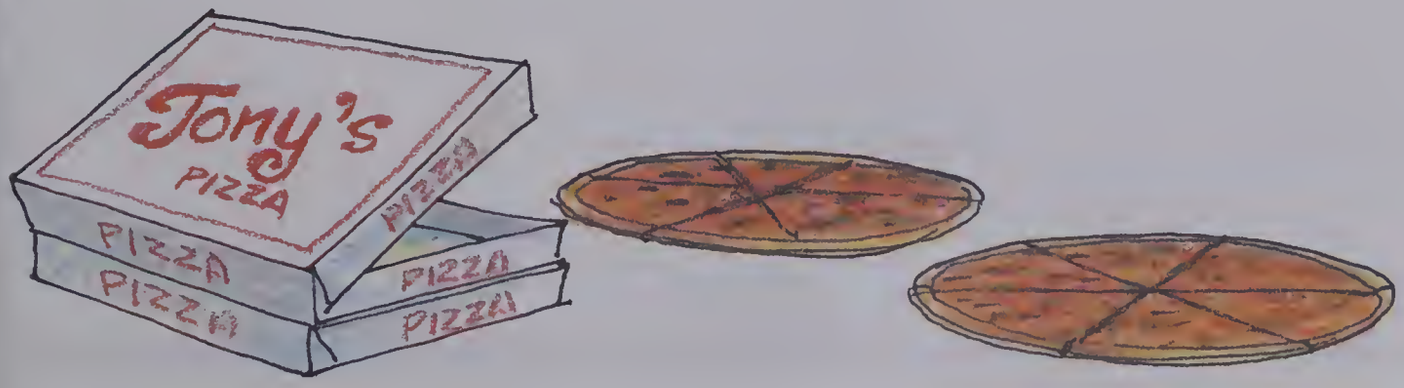


21. Anne had $\frac{9}{12}$ of a flat of strawberries. She used $\frac{1}{2}$ of a flat for pies. What fraction of a flat did she have left?

22. Jules picked $\frac{7}{8}$ of a pail of blueberries. He gave $\frac{1}{4}$ of the pail to his younger brother. What fraction of the pail of blueberries did he have left?

Pizza Puzzle

Some friends were having pizza. The pizzas were all cut into sixths. When Eugene came in, there were 4 pieces left. He ate 2 pieces. Then he cut a piece in half and ate one of the halves.
What fraction of a pizza was left?



Different Denominators

Subtract: $\frac{3}{4} - \frac{1}{3}$.

Find the least common denominator.

multiples of 4: 4, 8, (12)
multiples of 3: 3, 6, 9, (12)

12 is the least common denominator.

$$\begin{array}{r} \frac{3}{4} \\ -\frac{1}{3} \\ \hline \end{array}$$

Rewrite the fractions using the LCD.

$$\begin{array}{r} \frac{9}{12} \\ -\frac{4}{12} \\ \hline \end{array}$$

Subtract.

$$\begin{array}{r} \frac{9}{12} \\ -\frac{4}{12} \\ \hline \frac{5}{12} \end{array}$$

Remember to simplify if possible.

EXERCISES

What is the least common multiple?

1. 5, 10	**2.** 10, 30	**3.** 2, 8	**4.** 3, 12
5. 4, 6	**6.** 6, 8	**7.** 6, 9	**8.** 4, 5
9. 3, 7	**10.** 4, 7	**11.** 2, 5	**12.** 4, 9

Copy and complete.

13.
$$\begin{array}{r} \frac{5}{6} \\ -\frac{2}{9} \\ \hline \end{array} \qquad \begin{array}{r} \frac{\blacksquare}{18} \\ -\frac{\blacksquare}{18} \\ \hline \frac{\blacksquare}{18} \end{array}$$

14.
$$\begin{array}{r} \frac{1}{3} \\ -\frac{1}{4} \\ \hline \end{array} \qquad \begin{array}{r} \frac{\blacksquare}{12} \\ -\frac{\blacksquare}{12} \\ \hline \frac{\blacksquare}{12} \end{array}$$

15.
$$\begin{array}{r} \frac{5}{6} \\ -\frac{3}{8} \\ \hline \end{array} \qquad \begin{array}{r} \frac{\blacksquare}{24} \\ -\frac{\blacksquare}{24} \\ \hline \frac{\blacksquare}{\blacksquare} \end{array}$$

Subtract. Write the difference in simplest terms.

16.
$$\begin{array}{r} \frac{2}{3} \\ -\frac{2}{7} \\ \hline \end{array}$$

17.
$$\begin{array}{r} \frac{3}{4} \\ -\frac{1}{6} \\ \hline \end{array}$$

18.
$$\begin{array}{r} \frac{5}{6} \\ -\frac{3}{8} \\ \hline \end{array}$$

19.
$$\begin{array}{r} \frac{5}{9} \\ -\frac{1}{4} \\ \hline \end{array}$$

20. $\frac{4}{5} - \frac{1}{2}$ **21.** $\frac{4}{7} - \frac{1}{4}$ **22.** $\frac{3}{5} - \frac{2}{9}$ **23.** $\frac{5}{6} - \frac{1}{4}$

PRACTICE

Subtract. Write the difference in simplest terms.

1. $\frac{3}{4} - \frac{5}{12}$

2. $\frac{2}{3} - \frac{1}{10}$

3. $\frac{1}{5} - \frac{1}{7}$

4. $\frac{5}{6} - \frac{1}{2}$

5. $\frac{4}{5} - \frac{3}{8}$

6. $\frac{4}{6} - \frac{1}{5}$

7. $\frac{2}{5} - \frac{1}{4}$

8. $\frac{7}{8} - \frac{5}{6}$

9. $\frac{4}{9} - \frac{1}{4}$

10. $\frac{3}{8} - \frac{1}{12}$

11. $\frac{7}{8} - \frac{2}{3}$

12. $\frac{5}{9} - \frac{1}{6}$

Solve.

13. The Kanjis had about $\frac{3}{4}$ of a bag of peas in their freezer. After they used some for supper, about $\frac{1}{3}$ of a bag was left. What fraction of the bag did they use for supper?

14. The McKays estimated that they had used $\frac{2}{3}$ of their winter wood supply. They are half way through the winter.

a. What fraction of their supply is left?

b. Are they likely to need more wood before the end of winter?

Going in Reverse

Find the missing number.

a. $\frac{2}{3} - \frac{\blacksquare}{\blacksquare} = \frac{1}{24}$

b. $\frac{\blacksquare}{\blacksquare} - \frac{1}{6} = \frac{7}{30}$

c. $\frac{5}{6} - \frac{\blacksquare}{\blacksquare} = \frac{5}{12}$

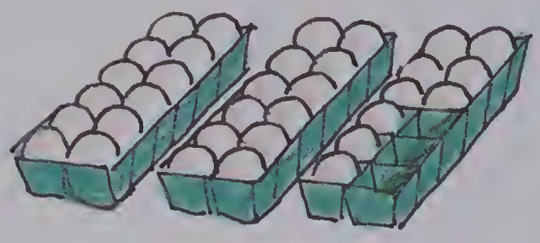
d. $\frac{\blacksquare}{\blacksquare} - \frac{5}{12} = \frac{5}{24}$

Subtracting Mixed Numerals

Subtract.

$$\begin{array}{r} 3\frac{5}{8} \\ -\,1\frac{1}{8} \\ \hline 2\frac{4}{8} \end{array} \quad 2\frac{4}{8} = 2\frac{1}{2}$$

$$3\frac{5}{8} - 1\frac{1}{8} = 2\frac{1}{2}$$



Rewrite using the LCD. Subtract.

$$\begin{array}{r} 2\frac{3}{4} \\ -\,1\frac{1}{6} \\ \hline \end{array} \quad \begin{array}{r} 2\frac{9}{12} \\ -\,1\frac{2}{12} \\ \hline \end{array} \quad \begin{array}{r} 2\frac{9}{12} \\ -\,1\frac{2}{12} \\ \hline 1\frac{7}{12} \end{array}$$

So, $2\frac{3}{4} - 1\frac{1}{6} = 1\frac{7}{12}$

Subtract the fractions first, then the whole numbers.

EXERCISES

Subtract. Write the difference in simplest terms.

1. $2\frac{5}{8} - 1\frac{4}{8}$ **2.** $6\frac{3}{4} - 4\frac{1}{4}$ **3.** $5\frac{5}{9} - 3\frac{4}{9}$ **4.** $7\frac{5}{6} - 2\frac{1}{6}$

5. $3\frac{4}{7} - 1\frac{2}{7}$ **6.** $8\frac{7}{10} - 5\frac{3}{10}$ **7.** $9\frac{7}{12} - 8\frac{1}{12}$ **8.** $4\frac{1}{2} - 2\frac{1}{2}$

9. $\begin{array}{r} 6\frac{8}{10} \\ -\,1\frac{1}{2} \\ \hline \end{array}$ **10.** $\begin{array}{r} 3\frac{1}{4} \\ -\,1\frac{1}{8} \\ \hline \end{array}$ **11.** $\begin{array}{r} 7\frac{5}{12} \\ -\,4\frac{1}{3} \\ \hline \end{array}$ **12.** $\begin{array}{r} 8\frac{2}{3} \\ -\,5\frac{2}{9} \\ \hline \end{array}$ **13.** $\begin{array}{r} 9\frac{2}{5} \\ -\,3\frac{4}{10} \\ \hline \end{array}$

14. $4\frac{3}{4} - 1\frac{2}{3}$ **15.** $5\frac{3}{5} - 2\frac{1}{4}$ **16.** $8\frac{7}{8} - \frac{1}{6}$ **17.** $13\frac{4}{5} - 11\frac{2}{6}$

PRACTICE

Subtract. Write the difference in simplest terms.

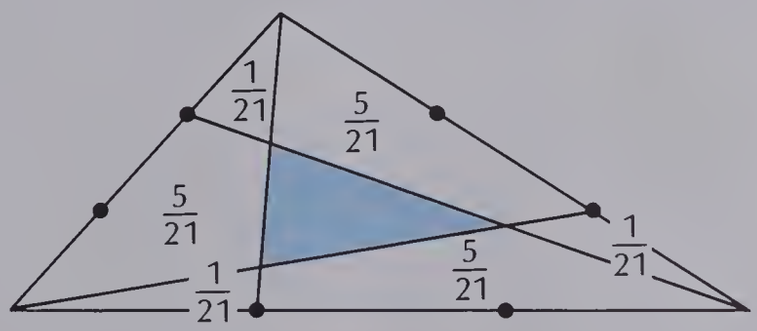
1. $6\frac{7}{12} - 2\frac{1}{2}$
2. $8\frac{3}{4} - 7\frac{1}{6}$
3. $5\frac{7}{10} - 3\frac{1}{5}$
4. $4\frac{2}{3} - 1\frac{1}{8}$
5. $7\frac{5}{8} - 2\frac{1}{6}$
6. $3\frac{7}{8} - 1\frac{1}{4}$
7. $8\frac{9}{10} - 5\frac{1}{2}$
8. $3\frac{2}{3} - 1\frac{3}{10}$
9. $2\frac{4}{5} - 1\frac{4}{15}$
10. $13\frac{7}{12} - 1\frac{1}{6}$
11. $9\frac{5}{6} - \frac{2}{5}$
12. $20\frac{5}{7} - 8\frac{3}{14}$
13. $3\frac{2}{3} - \frac{3}{7}$
14. $8\frac{3}{12} - 6\frac{1}{4}$
15. $5\frac{4}{5} - \frac{1}{5}$
16. $20\frac{7}{8} - 9\frac{2}{3}$

Solve.

17. Sunset Orange Juice Company sold $2\frac{1}{2}$ million dollars worth of juice last year. This year, sales decreased by $\frac{3}{4}$ million dollars. What were this year's sales?

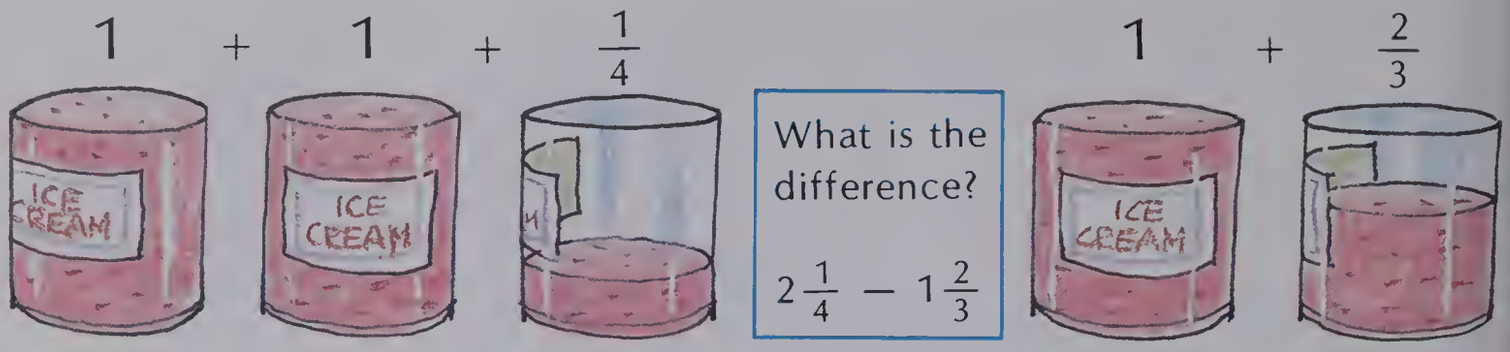
18. Roberto planted $3\frac{1}{2}$ rows of vegetables. Onions take up $\frac{1}{2}$ row, carrots $\frac{3}{4}$ row, peas $1\frac{1}{3}$ row, radishes $\frac{1}{4}$ row, and corn the rest. How many rows of corn does he have?

Triangular Fractions



The sides of the triangle are divided in thirds.
The fractions show the part of the total area taken up by each section.
What fraction of the whole triangle is in the shaded section?

Subtracting Mixed Numerals



What is the difference?

$2\frac{1}{4} - 1\frac{2}{3}$

Rewrite with the LCD.

$$2\frac{1}{4} \longrightarrow 2\frac{3}{12}$$
$$-1\frac{2}{3} \longrightarrow -1\frac{8}{12}$$

Regroup.

$$1\frac{15}{12}$$
$$\cancel{2}\,\cancel{\frac{3}{12}}$$
$$-1\frac{8}{12}$$

Subtract.

$$1\frac{15}{12}$$
$$\cancel{2}\,\cancel{\frac{3}{12}}$$
$$-1\frac{8}{12}$$
$$\frac{7}{12}$$

Remember to simplify the answer if possible.

So, $2\frac{1}{4} - 1\frac{2}{3} = \frac{7}{12}$

EXERCISES

Regroup.

1. $2\frac{1}{3} = 1\frac{\blacksquare}{3}$
2. $8\frac{2}{5} = 7\frac{\blacksquare}{5}$
3. $5\frac{4}{7} = 4\frac{\blacksquare}{7}$
4. $3\frac{3}{8} = 2\frac{\blacksquare}{8}$
5. $4\frac{3}{10} = 3\frac{\blacksquare}{10}$
6. $7\frac{1}{6} = 6\frac{\blacksquare}{6}$
7. $9\frac{3}{5} = 8\frac{\blacksquare}{5}$
8. $6\frac{4}{9} = 5\frac{\blacksquare}{9}$

Subtract. Write the difference in simplest terms.

9. $6\frac{1}{6} - 4\frac{5}{6}$
10. $8\frac{3}{10} - 2\frac{7}{10}$
11. $9\frac{1}{12} - 7\frac{5}{12}$
12. $5\frac{1}{4} - 2\frac{3}{4}$
13. $4\frac{3}{8} - 1\frac{7}{8}$
14. $5\frac{1}{3} - 3\frac{5}{6}$
15. $4\frac{1}{2} - 1\frac{3}{4}$
16. $6\frac{3}{8} - 2\frac{3}{4}$
17. $5\frac{2}{9} - 2\frac{2}{3}$
18. $3\frac{1}{4} - 1\frac{5}{12}$
19. $7\frac{2}{5} - 1\frac{2}{3}$
20. $6\frac{1}{4} - 2\frac{2}{5}$
21. $5\frac{1}{3} - 4\frac{7}{8}$
22. $14\frac{3}{10} - 11\frac{2}{3}$

PRACTICE

Regroup.

1. $4\frac{2}{3} = 3\frac{\blacksquare}{3}$ 2. $7\frac{3}{4} = 6\frac{\blacksquare}{4}$ 3. $5\frac{2}{5} = 4\frac{\blacksquare}{5}$ 4. $3\frac{4}{5} = 2\frac{\blacksquare}{5}$

5. $5\frac{2}{4} = \blacksquare\frac{6}{4}$ 6. $7\frac{2}{3} = \blacksquare\frac{5}{3}$ 7. $6\frac{\blacksquare}{5} = 5\frac{7}{5}$ 8. $8\frac{\blacksquare}{6} = 7\frac{11}{6}$

Subtract. Write the difference in simplest terms.

9. $7\frac{5}{8} - 2\frac{3}{4}$ 10. $7\frac{1}{6} - 4\frac{4}{9}$ 11. $10\frac{2}{3} - 3\frac{3}{4}$ 12. $5\frac{1}{3} - 4\frac{3}{4}$ 13. $9\frac{3}{10} - 4\frac{3}{5}$

14. $7\frac{3}{5} - 4\frac{3}{4}$ 15. $9\frac{1}{2} - 6\frac{7}{8}$ 16. $9\frac{3}{16} - 1\frac{3}{8}$ 17. $5\frac{1}{16} - 4\frac{5}{8}$

18. $6\frac{1}{3} - 4\frac{4}{5}$ 19. $13\frac{7}{10} - 9\frac{5}{6}$ 20. $24\frac{1}{2} - 18\frac{5}{6}$ 21. $10\frac{2}{7} - 8\frac{1}{3}$

Solve.

22. Jan made popcorn for a party. She started with $1\frac{1}{2}$ boxes of corn. When she was finished, about $\frac{2}{3}$ of a box was left. How much corn did she use?

Fraction ABCs

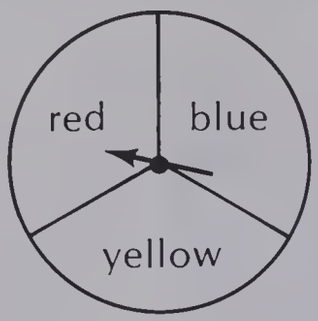
1. A, B, and C represent three different numerals between 1 to 9. What are they?

$$\frac{1}{A} + \frac{1}{B} + \frac{1}{C} = 1$$

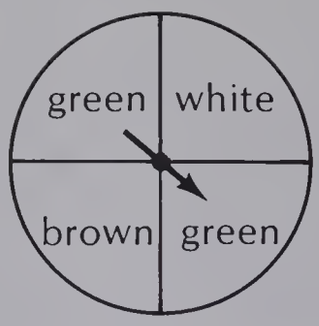
2. P and Q represent two different numerals between 1 and 9. What are they?

$$\frac{P}{Q} - \frac{Q}{P} = \frac{P+Q}{P \times Q}$$

Probability



There is one chance in three of spinning red.
The **probability** of red is $\frac{1}{3}$.

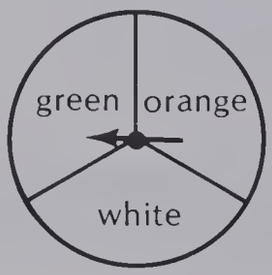


There are two chances in four of spinning green.
The probability of green is $\frac{2}{4}$ (or $\frac{1}{2}$).

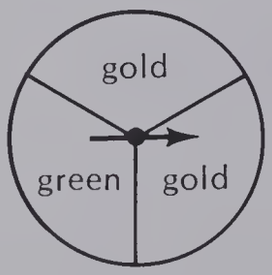
$$\text{Probability} = \frac{\text{number of expected outcomes}}{\text{number of possible outcomes}}$$

EXERCISES

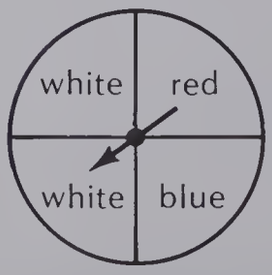
Find the probability.



1. The probability of green is $\frac{\blacksquare}{3}$.
2. The probability of orange is $\frac{\blacksquare}{3}$.
3. The probability of white is $\frac{\blacksquare}{3}$.



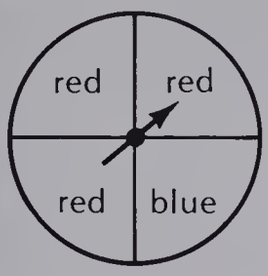
4. The probability of gold is $\frac{\blacksquare}{3}$.
5. The probability of green is $\frac{\blacksquare}{3}$.
6. The probability of red is $\frac{\blacksquare}{3}$.

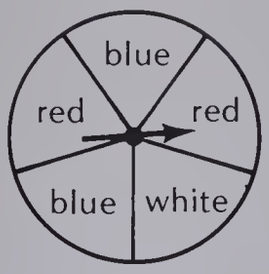


7. The probability of white is $\frac{\blacksquare}{\blacksquare}$.
8. The probability of red is $\frac{\blacksquare}{\blacksquare}$.
9. The probability of blue is $\frac{\blacksquare}{\blacksquare}$.

PRACTICE

What is the probability?





1. red
2. blue
3. red
4. blue
5. white
6. green
7. ●●
8. ●
9. ●● ●●
10. ●●●

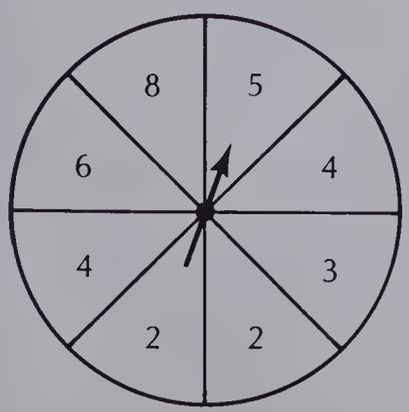
Solve.

11. A spinner has six sections: red, gold, green, red, red, and gold. What is the probability of spinning a gold? a red? a green?

12. A coin is tossed. What is the probability of tossing heads? tails?

13. Suppose a spinner has four sections, all red. What is the probability of spinning red? black?

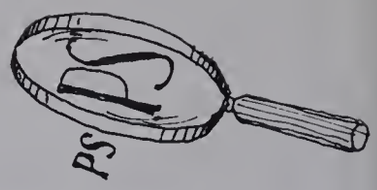
Spinnerama



What is the probability?

1. 5
2. 4
3. 3
4. 2
5. 6
6. 8
7. 10
8. a number less than 5
9. an odd number
10. an even number
11. 8 or 5
12. 3 or 4

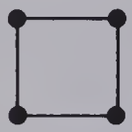
Problem Solving



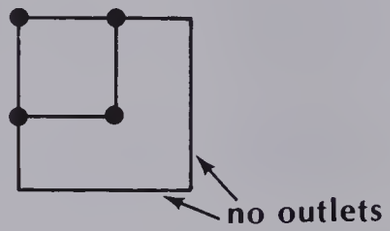
A farmer has a square garden with irrigation outlets at the four corners. He wants to enlarge the garden so that it is still square but twice its present size. He doesn't want to move the present outlets so they should be on the edges of the field. How can he lay out the enlarged field?

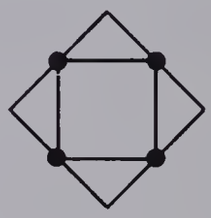
Use a diagram.

present field



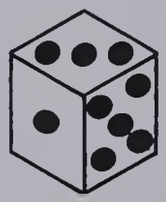
experiment





Victor rolled a die. What is the probability he rolled a 6? an even number?

Use a model.



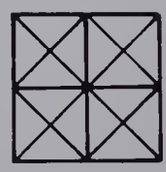
The probability of rolling a 6 is $\frac{1}{6}$.

The probability of rolling an even number is $\frac{3}{6}$ or $\frac{1}{2}$.

EXERCISES

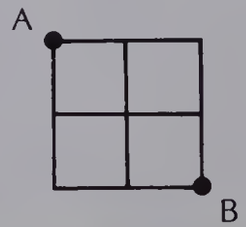
Use a model or a diagram to solve the problem.

1. How many different squares are there in this diagram?



2. What is the probability of getting two heads when you toss two coins?
   Hint. Show all the possible outcomes.

3. How many different ways are there to walk from A to B without retracing your steps?



PRACTICE

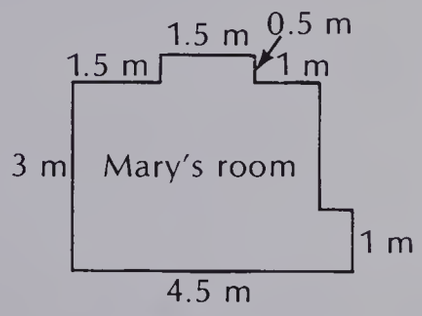
Use a model or a diagram to solve.

1. Ted walked 2 km north, then 3 km east. Then he walked 1.5 km south, 2 km west, and 0.5 km south. How far is he from where he started?

2. How many tiles 2 cm by 3 cm can be put in a frame 7 cm by 11 cm? (No overlapping.)

3. There are four red socks and six blue socks in a drawer. You pull out a blue sock. What is the probability of picking another blue sock?

4. How many square metres of carpet will Mary need to cover her room?



5. Jeanne, Ken, and Lois are the top three students on the honours list. How many different ways might they place?

REVIEW

A65 Subtract. Write the difference in simplest terms.

1. $\frac{2}{5} - \frac{1}{10}$ 2. $\frac{2}{3} - \frac{2}{9}$ 3. $\frac{3}{4} - \frac{1}{8}$

A66

4. $\frac{3}{5} - \frac{1}{2}$ 5. $\frac{3}{7} - \frac{1}{4}$ 6. $\frac{5}{6} - \frac{3}{8}$

A67

7. $3\frac{3}{4} - 1\frac{2}{3}$ 8. $7\frac{5}{12} - 2\frac{1}{3}$ 9. $8\frac{4}{5} - 3\frac{1}{6}$

A68

10. $5\frac{3}{8} - 2\frac{3}{4}$ 11. $7\frac{1}{4} - 3\frac{2}{5}$ 12. $9\frac{3}{5} - 5\frac{2}{3}$

A69 What is the probability?

13. 1 14. 3 15. 5

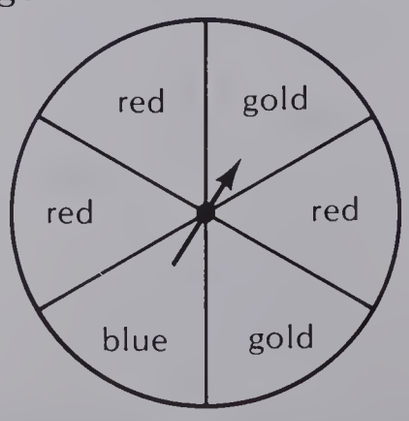
TEST UNIT 14

Add or subtract. Write the answer in simplest terms.

1. $\frac{1}{7} + \frac{3}{7}$
2. $\frac{3}{10} + \frac{9}{10}$
3. $\frac{3}{50} + \frac{7}{50}$
4. $\frac{1}{12} + \frac{1}{4}$
5. $\frac{2}{5} + \frac{3}{10}$
6. $\frac{7}{8} + \frac{3}{4}$
7. $\frac{2}{3} + \frac{1}{9}$
8. $\frac{1}{6} + \frac{4}{5}$
9. $\frac{3}{4} + \frac{7}{10}$
10. $\frac{1}{8} + \frac{5}{6}$
11. $\frac{5}{8} + \frac{1}{3}$
12. $7\frac{2}{5} + 2\frac{1}{4}$
13. $8\frac{1}{2} + 5\frac{1}{4}$
14. $3\frac{7}{12} + 2\frac{1}{5}$
15. $4\frac{1}{4} + 5\frac{8}{9}$
16. $\frac{6}{7} - \frac{2}{7}$
17. $\frac{11}{12} - \frac{1}{3}$
18. $\frac{2}{3} - \frac{2}{9}$
19. $\frac{5}{6} - \frac{1}{9}$
20. $\frac{5}{6} - \frac{3}{8}$
21. $\frac{3}{7} - \frac{1}{4}$
22. $5\frac{1}{4} - 2\frac{1}{8}$
23. $7\frac{2}{3} - 3\frac{2}{9}$
24. $6\frac{3}{4} - 1\frac{2}{3}$
25. $9\frac{7}{8} - \frac{1}{6}$
26. $4\frac{3}{10} - 1\frac{9}{10}$
27. $8\frac{1}{12} - 5\frac{5}{12}$
28. $7\frac{2}{9} - 3\frac{2}{3}$
29. $4\frac{1}{4} - 2\frac{2}{5}$
30. $2\frac{2}{3} - \frac{3}{4}$

What is the probability?

31. blue
32. red
33. gold
34. green



LOOKING BACK

GRAPHS

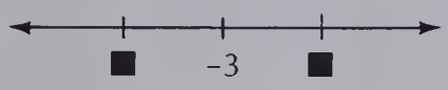
Copy and complete the pattern. State the rule.

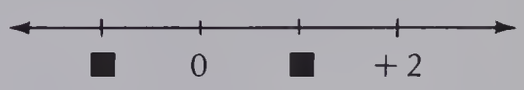
1. (1, 2) (2, 4) (3, 6) (4, 8) (■, ■) (■, ■)
2. (1, 6) (2, 7) (3, 8) (4, 9) (■, ■) (■, ■)

Which temperature is higher?

3. 7°C or 0°C
4. −8°C or 3°C
5. −9°C or −2°C

Copy. Fill in the missing integers.

6. 

7. 

Copy and complete using $>$ or $<$.

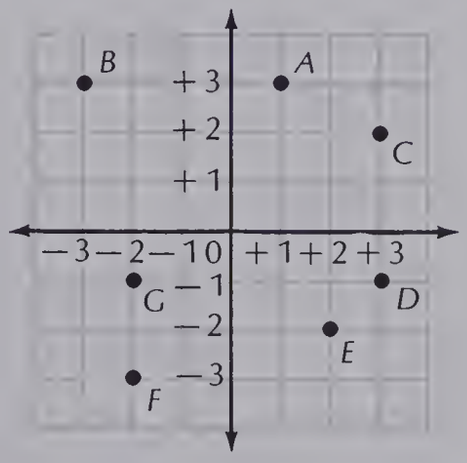
8. $-2 \bullet -4$
9. $+11 \bullet +1$
10. $-6 \bullet +3$

Name the point for the ordered pair.

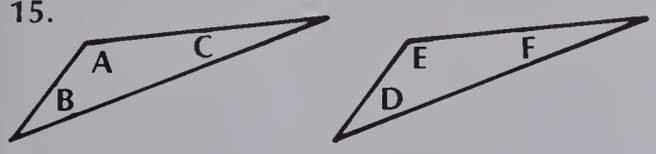
11. $(-3, +3)$
12. $(+3, -1)$

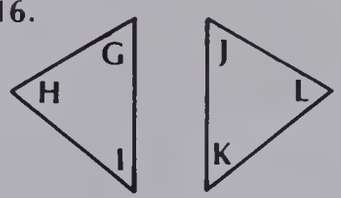
Write the ordered pair for the point.

13. A
14. G



Name the corresponding angles in these similar triangles.

15. 

16. 

Solve.

17. A drawing is 4 cm long. The scale ratio is 1:5. How long is the real object?

18. A drawing is 2 cm tall. The scale ratio is 1:6. How tall is the real object?

Cumulative Test

UNITS 1-4

Write in standard form.

1. $4000 + 700 + 5 + 0.6 + 0.09$
2. $80\,000\,000 + 200\,000 + 10\,000 + 400 + 60 + 9$
3. Sixty seven and nine hundred sixteen ten thousandths

Copy and complete. Use $<$, $=$, or $>$.

4. $43\,592\,610 \bullet 43\,592\,601$
5. $890\,247\,634\,119 \bullet 980\,247\,634\,119$
6. $60.158 \bullet 60.185$
7. $309.1658 \bullet 310.9658$

Round.

8. 294 501 638 to the nearest thousand
9. 314.9708 to the nearest hundredth

Write in expanded form.

10. 7 362 045
11. 0.819
12. 5021.93

Add or subtract.

13. $254 + 76$
14. $695 + 807$
15. $\$5.95 + 8.27$
16. $4.9 + 8.3$
17. $18.73 + 7.28$
18. $94 - 38$
19. $500 - 213$
20. $3074 - 516$
21. $8526 - 4709$
22. $\$8.17 - 4.59$
23. $4\,206 + 27\,184 + 391$
24. $\$13.24 + 6.58 + 27.09$
25. $0.12 + 0.8 + 0.375$
26. $15.26 + 8.1 + 37.08$
27. $\$40.02 - 23.15$
28. $50.4 - 27.6$
29. $0.2 - 0.13$
30. $3.43 - 0.852$

Copy and complete.

31. $7^2 = \blacksquare \times \blacksquare$
$= \blacksquare$

32. $3^4 = \blacksquare \times \blacksquare \times \blacksquare \times \blacksquare$
$= \blacksquare$

Multiply.

33. 35×9

34. 605×8

35. 147×3

36. 2940×6

37. 6250×7

38. 23×48

39. 45×79

40. 591×64

41. 208×56

42. 700×80

43. 141×236

44. 387×592

45. 400×76

46. $\$91.54 \times 8$

47. $\$362.25 \times 41$

48. 5.3×4

49. 47×3.2

50. 64.2×813

51. 5.12×6

52. 277×0.15

Divide.

53. $8\overline{)96}$

54. $5\overline{)120}$

55. $6\overline{)297}$

56. $3\overline{)782}$

57. $9\overline{)9045}$

58. $7\overline{)6315}$

59. $20\overline{)300}$

60. $36\overline{)75}$

61. $42\overline{)2772}$

62. $68\overline{)8904}$

63. $25\overline{)29\,800}$

64. $40\overline{)14\,000}$

65. $16\overline{)4912}$

66. $51\overline{)846}$

67. $13\overline{)10\,452}$

Solve.

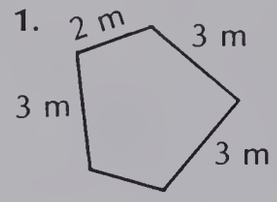
68. Shares of Nugget Mines are trading at $8.75 a share. What is the cost of 200 shares?

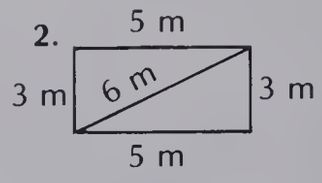
69. Fred's heart beats 4380 times in 1 h. How many times does it beat each minute?

Cumulative Test

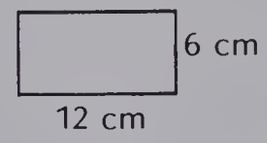
UNITS 5-8

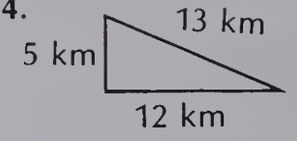
Find the perimeter.

1. 

2. 

Find the area.

3. 

4. 

Calculate the circumference of a circle with each diameter.

5. 12 cm **6.** 41 mm **7.** 18 m **8.** 200 km

Calculate the area of a circle with each radius.

9. 5 cm **10.** 7 mm **11.** 13 m **12.** 24 cm

Calculate the volume of the box.

13. $L = 5$ cm, $W = 4$ cm, $H = 4$ cm **14.** $L = 8$ m, $W = 3$ m, $H = 5$ m

Copy and complete.

15. 6000 kg = ■ t **16.** 7 L = ■ mL **17.** 8000 L = ■ kL

18. The mass of 3 L of water is ■.

19. From 08:00 to 13:00 is ■ h.

List the first five multiples for each number. Find the LCM.

20. 4 and 5 **21.** 6 and 8 **22.** 3 and 7

List the factors for each number. Find the GCF.

23. 21 and 24 **24.** 12 and 18 **25.** 10 and 20

Make a factor tree to express each number as a product of prime factors. Write the product using exponents.

26. 24 **27.** 30 **28.** 48

Copy and simplify each expression.

29. $5 \times 9 - 3$ **30.** $6 \times 8 + 10 \div 5$ **31.** $(5 + 3) \div 2$

Solve for N. Check.

32. $N + 50 = 82$ **33.** $N - 33 = 66$ **34.** $N \div 50 = 5$

Copy and complete.

35. $\frac{\blacksquare}{3} = \frac{4}{6}$ **36.** $\frac{1}{3} = \frac{\blacksquare}{9} = \frac{\blacksquare}{15}$ **37.** $\frac{6}{10} = \frac{3}{\blacksquare}$

Write in simplest terms.

38. $\frac{3}{6}$ **39.** $\frac{2}{8}$ **40.** $\frac{5}{15}$ **41.** $\frac{4}{10}$ **42.** $\frac{11}{22}$

Copy and complete. Use $<$ or $>$.

43. $\frac{1}{2} \bullet \frac{3}{2}$ **44.** $\frac{3}{4} \bullet \frac{3}{5}$ **45.** $\frac{2}{3} \bullet \frac{4}{5}$

Write as a fraction.

46. $4\frac{1}{3}$ **47.** $2\frac{5}{8}$

Write as a mixed numeral.

48. $\frac{15}{2}$ **49.** $\frac{36}{10}$

Write as a decimal.

50. $\frac{8}{10}$ **51.** $\frac{38}{100}$ **52.** $\frac{16}{25}$ **53.** $\frac{1}{50}$

Multiply. Write the answer in simplest terms.

54. $\frac{1}{5} \times 10$ **55.** $\frac{3}{10} \times 20$ **56.** $\frac{2}{3} \times 18$

57. $\frac{3}{4} \times 14$ **58.** $21 \times \frac{5}{6}$ **59.** $30 \times \frac{3}{8}$

60. $\frac{2}{3} \times \frac{5}{6}$ **61.** $\frac{3}{4} \times \frac{1}{5}$ **62.** $\frac{5}{8} \times \frac{3}{7}$

63. $8 \times 2\frac{1}{2}$ **64.** $\frac{1}{3} \times 1\frac{1}{2}$ **65.** $3\frac{1}{4} \times \frac{2}{5}$

Find the product.

66. $\begin{array}{r} 4.7 \\ \times\ 15 \\ \hline \end{array}$ **67.** $\begin{array}{r} 8.15 \\ \times\ 42 \\ \hline \end{array}$ **68.** $\begin{array}{r} 0.7 \\ \times 0.5 \\ \hline \end{array}$ **69.** $\begin{array}{r} 3.8 \\ \times 0.9 \\ \hline \end{array}$

70. $\begin{array}{r} 0.08 \\ \times\ 0.3 \\ \hline \end{array}$ **71.** $\begin{array}{r} 0.27 \\ \times\ 0.6 \\ \hline \end{array}$ **72.** $\begin{array}{r} 3.41 \\ \times\ 5.5 \\ \hline \end{array}$ **73.** $\begin{array}{r} 8.03 \\ \times\ 6.7 \\ \hline \end{array}$

Cumulative Test

UNITS 9-11

Solve.

1. 4 kg cost $14.52. What does 1 kg cost?
2. 1 box costs $3.55. What do 5 boxes cost?
3. A bus went 125 km in 2 h. How far will it go in 6 h?

Use these figures to write the ratio.

4. squares to circles
5. triangles to squares
6. circles to triangles
7. triangles to circles

Solve for N.

8. $\frac{3}{5} = \frac{9}{N}$
9. $\frac{2}{3} = \frac{N}{15}$
10. $\frac{N}{8} = \frac{1}{4}$
11. $\frac{4}{N} = \frac{24}{30}$

Copy and complete the chart.

	Fraction	Decimal	Percent
12.	$\frac{2}{5}$		
13.		0.13	
14.			65%

Calculate.

15. 23% of 400
16. 10% of 20
17. 40% of $50

Write the reciprocal of each.

18. $\frac{1}{2}$
19. $\frac{5}{4}$
20. $2\frac{2}{3}$
21. 9

Divide.

22. $\frac{3}{10} \div 2$
23. $\frac{1}{2} \div 5$
24. $8 \div \frac{1}{4}$
25. $\frac{2}{3} \div \frac{1}{5}$
26. $12 \div \frac{1}{2}$
27. $\frac{2}{3} \div \frac{9}{10}$
28. $3 \div \frac{5}{6}$
29. $4\frac{1}{5} \div \frac{7}{8}$
30. $3\overline{)0.9}$
31. $5\overline{)21.5}$
32. $8\overline{)6.16}$
33. $0.4\overline{)48}$

34. $0.2\overline{)0.36}$ **35.** $3.1\overline{)0.062}$ **36.** $4.4\overline{)5.28}$ **37.** $0.06\overline{)0.18}$

38. $0.06\overline{)0.522}$ **39.** $0.07\overline{)8.4}$ **40.** $0.12\overline{)6.00}$ **41.** $0.8\overline{)5.68}$

Divide. Round the quotient to the nearest hundredth.

42. $9\overline{)8.8}$ **43.** $6\overline{)4}$ **44.** $0.3\overline{)4.9}$ **45.** $7.1\overline{)0.48}$

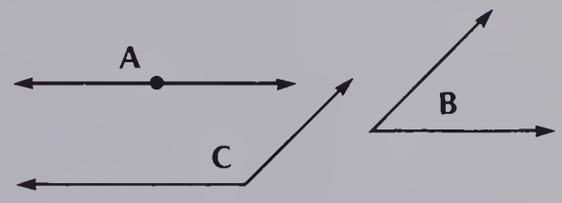
Express each fraction as a decimal. Divide until the remainder is zero.

46. $\frac{3}{8}$ **47.** $\frac{67}{50}$ **48.** $\frac{2}{5}$ **49.** $\frac{13}{25}$

What are the range, mode, mean, and median of each set of numbers? Round the mean to the nearest whole number.

50. 25, 12, 27, 19, 27, 34, 32

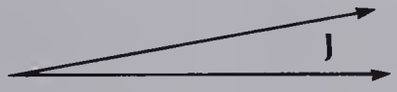
51. 10, 20, 20, 30, 40, 40, 40, 50

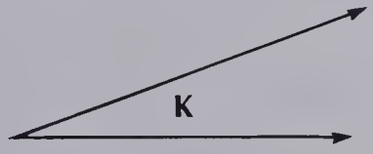


52. Which angle is an obtuse angle?

53. Which angle is a straight angle?

54. Which angle below measures 10°?





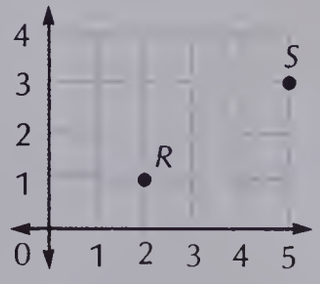
55. How much did Pam save in June?

56. Who saved more in August?

57. In what month did they both save the same amount?

Write the ordered pair for the point.

58. *R* **59.** *S*



Construct a circle graph to show the information.

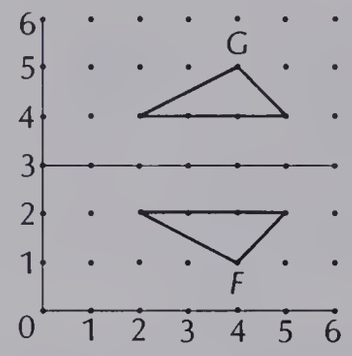
60. Rita had \$12 to spend at the carnival. She spent \$6 on rides, \$4 on refreshments, and \$2 on a hat.

Cumulative Test

UNITS 12-14

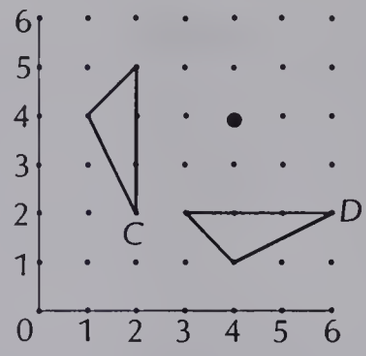
Write slide, flip, or turn. Copy and complete the sentences below.

1.



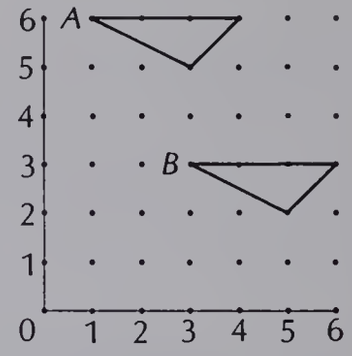
4. G is at (■, ■). The image of G is at (■, ■).

2.



5. C is at (■, ■). The image of C is at (■, ■).

3.



6. A is at (■, ■). The image of A is at (■, ■).

The figures at the right are congruent. Copy and complete the statements.

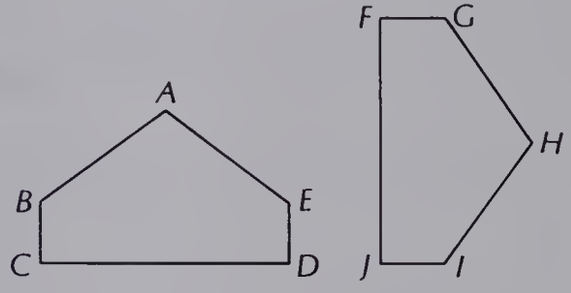
7. Angle B is congruent to angle ■.

8. Side AB is congruent to side ■.

9. Angle C is a right angle. Sides BC and ■ are perpendicular.

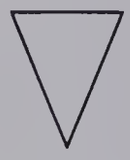
10. Sides BC and ■ are parallel.

11. Angle D corresponds to angle ■.

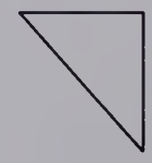


Name each triangle (right, isosceles, or equilateral).

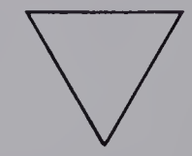
12.



13.

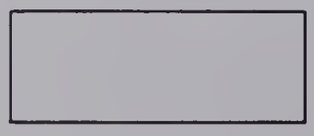


14.

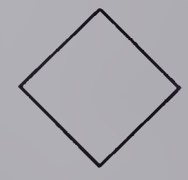


Name each quadrilateral.

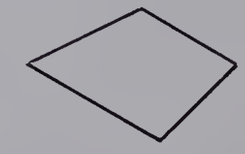
15.



16.



17.



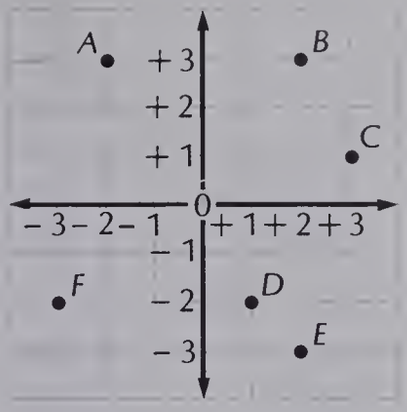
Copy and complete the pattern. State the rule.

18. (1, 3) (2, 6) (3, 9) (4, ■) ● ● ● (8, ■)

19. (5, 0) (6, 1) (7, 2) (8, ■) ● ● ● (12, ■)

Copy and complete. Use $>$ or $<$.

20. $+7 \bullet +10$ **21.** $-9 \bullet -4$ **22.** $+3 \bullet -6$



Name the point.

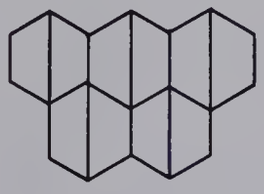
23. $(+2, -3)$ **24.** $(-2, +3)$

Write the ordered pair.

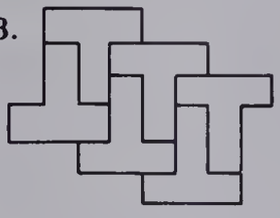
25. C **26.** F

Is the pattern a tessellation?

27.



28.



Add or subtract.

29. $\frac{3}{8} + \frac{1}{8}$ **30.** $\frac{2}{3} + \frac{1}{3}$ **31.** $\frac{1}{5} + \frac{2}{5}$ **32.** $\frac{1}{2} + \frac{1}{4}$

33. $\frac{3}{5} + \frac{3}{10}$ **34.** $\frac{1}{3} + \frac{5}{6}$ **35.** $\frac{3}{4} + \frac{1}{5}$ **36.** $\frac{1}{2} + \frac{2}{3}$

37. $\frac{3}{8} + \frac{2}{5}$ **38.** $\frac{7}{10} - \frac{3}{10}$ **39.** $\frac{57}{100} - \frac{3}{10}$ **40.** $\frac{7}{8} - \frac{3}{4}$

41. $\frac{5}{6} - \frac{2}{5}$ **42.** $\frac{9}{10} - \frac{3}{4}$ **43.** $\frac{5}{8} - \frac{1}{3}$ **44.** $\frac{3}{4} - \frac{1}{6}$

45. $3\frac{1}{8} + 5\frac{3}{8}$ **46.** $2\frac{3}{10} + 4\frac{2}{10}$ **47.** $1\frac{1}{3} + 7\frac{4}{5}$

48. $6\frac{7}{10} - 4\frac{1}{2}$ **49.** $8\frac{3}{10} - 2\frac{1}{2}$ **50.** $9\frac{1}{6} - 3\frac{7}{8}$

Solve.

51. A drawing is 4 cm long. The scale is 1 cm = 3 m. How long is the real object?

52. Jack agreed to mow a lawn for \$5. He hired a friend at \$1.85/h to do it for him. It took the friend 2 h to mow the lawn. How much profit did Jack make?

Addition

Add.

1. 328 + 94	**2.** 83 + 451	**3.** 915 + 36	**4.** 65 + 847	**5.** 999 + 99
6. 426 + 105	**7.** 948 + 373	**8.** 500 + 800	**9.** 218 + 793	**10.** 464 + 464
11. 231 + 864 + 795	**12.** 407 + 136 + 291	**13.** 301 + 56 + 249	**14.** 58 + 249 + 5	**15.** 607 + 8 + 36

16. 560 + 24 **17.** 209 + 470 **18.** 403 + 65 + 210

19. 5538 + 3162	**20.** 8006 + 4127	**21.** 516 + 4922	**22.** 3078 + 953	**23.** 1494 + 3027
24. 46 697 + 20 810	**25.** 75 092 + 6 813	**26.** 34 582 + 17 649	**27.** 6 285 + 24 139	
28. 29 + 87 + 54 + 32	**29.** 143 + 269 + 580 + 372	**30.** 294 + 18 + 75 + 103	**31.** 438 + 9 + 65 + 702	
32. 27 + 9 + 14 + 3 + 81	**33.** 604 + 5 + 83 + 219 + 70	**34.** 37 306 + 8 + 291 + 52 + 4 815	**35.** 18 + 4 092 + 375 + 26 153 + 1	
36. $24.95 + 13.72	**37.** $54.75 + 8.66	**38.** $ 6.15 + 93.85	**39.** $62.93 + 40.07	

Subtraction

Subtract.

1. 53 − 28	**2.** 71 − 14	**3.** 60 − 29	**4.** 92 − 43	**5.** 80 − 35
6. 824 − 76	**7.** 200 − 55	**8.** 507 − 32	**9.** 591 − 98	**10.** 500 − 16
11. 410 − 169	**12.** 953 − 487	**13.** 821 − 463	**14.** 805 − 316	**15.** 700 − 282

16. 90 − 35 **17.** 648 − 399 **18.** 500 − 246

19. 4631 − 852	**20.** 1800 − 372	**21.** 5920 − 664	**22.** 4096 − 587	**23.** 3546 − 273
24. 5110 − 2734	**25.** 4000 − 1365	**26.** 8295 − 6497	**27.** 3146 − 1158	**28.** 9020 − 2161
29. 63 102 − 5 843	**30.** 29 064 − 1 958	**31.** 77 156 − 4 829	**32.** 98 412 − 3 690	
33. 26 541 − 19 783	**34.** 90 000 − 72 068	**35.** 30 927 − 19 473	**36.** 56 284 − 31 747	
37. \$52.19 − 34.50	**38.** \$69.98 − 49.99	**39.** \$80.00 − 17.23	**40.** \$125.08 − 62.39	
41. \$371.26 − 34.88	**42.** \$586.42 − 297.69	**43.** \$231.00 − 154.14	**44.** \$438.51 − 169.75	

Multiplication

Multiply.

1. 4×9
2. 8×5
3. 60×4
4. 30×7

5.	6.	7.	8.	9.
75	61	56	95	34
$\times$ 2	$\times$ 6	$\times$ 7	$\times$ 5	$\times$ 8

10.	11.	12.	13.	14.
451	207	392	500	216
$\times$ 8	$\times$ 9	$\times$ 5	$\times$ 9	$\times$ 8

15.	16.	17.	18.	19.
7684	5080	4157	3291	6004
$\times$ 3	$\times$ 4	$\times$ 6	$\times$ 7	$\times$ 9

20.	21.	22.	23.	24.
45	72	29	82	65
$\times$38	$\times$61	$\times$50	$\times$69	$\times$73

25.	26.	27.	28.	29.
208	615	759	438	691
$\times$ 48	$\times$ 93	$\times$ 26	$\times$ 30	$\times$ 57

30.	31.	32.	33.	34.
267	514	809	400	748
$\times$ 34	$\times$ 65	$\times$ 18	$\times$ 30	$\times$ 29

35.	36.	37.	38.	39.
358	941	536	369	132
$\times$262	$\times$703	$\times$418	$\times$840	$\times$565

40.	41.	42.	43.	44.
200	139	801	348	614
$\times$500	$\times$482	$\times$700	$\times$395	$\times$253

45.	46.	47.	48.
\$62.50	\$129.95	\$24.89	\$146.74
$\times$ 3	$\times$ 7	$\times$ 15	$\times$ 29

49. $4 \times 4 \times 4 \times 4$
50. $2 \times 2 \times 2 \times 2 \times 2$
51. $6 \times 6 \times 6$

Division

Divide.

1. $54 \div 9$
2. $40 \div 5$
3. $63 \div 7$
4. $28 \div 4$
5. $6\overline{)45}$
6. $8\overline{)58}$
7. $3\overline{)22}$
8. $9\overline{)66}$
9. $7\overline{)32}$
10. $164 \div 4$
11. $384 \div 6$
12. $802 \div 2$
13. $270 \div 5$
14. $8\overline{)544}$
15. $4\overline{)200}$
16. $3\overline{)249}$
17. $7\overline{)651}$
18. $5\overline{)605}$
19. $9\overline{)482}$
20. $3\overline{)704}$
21. $7\overline{)395}$
22. $4\overline{)646}$
23. $8\overline{)267}$
24. $6\overline{)1482}$
25. $2\overline{)5934}$
26. $5\overline{)3050}$
27. $9\overline{)9144}$
28. $4\overline{)3172}$
29. $8\overline{)7025}$
30. $3\overline{)3914}$
31. $7\overline{)8602}$
32. $5\overline{)1693}$
33. $9\overline{)8745}$

Division

Divide.

1. $60\overline{)720}$
2. $20\overline{)595}$
3. $90\overline{)2583}$
4. $10\overline{)6410}$
5. $40\overline{)4392}$
6. $23\overline{)483}$
7. $41\overline{)738}$
8. $60\overline{)900}$
9. $18\overline{)972}$
10. $35\overline{)875}$
11. $90\overline{)600}$
12. $52\overline{)913}$
13. $83\overline{)769}$
14. $74\overline{)840}$
15. $17\overline{)321}$
16. $33\overline{)1683}$
17. $66\overline{)1518}$
18. $29\overline{)1682}$
19. $19\overline{)1862}$
20. $43\overline{)3526}$
21. $24\overline{)1738}$
22. $93\overline{)9608}$
23. $52\overline{)6481}$
24. $80\overline{)4060}$
25. $76\overline{)4913}$
26. $41\overline{)23\,821}$
27. $28\overline{)56\,868}$
28. $64\overline{)56\,000}$
29. $37\overline{)37\,740}$
30. $55\overline{)37\,345}$
31. $94\overline{)82\,395}$
32. $15\overline{)36\,841}$
33. $71\overline{)95\,624}$
34. $83\overline{)64\,722}$
35. $30\overline{)35\,060}$

Addition

Add.

1. $4.36 + 2.95	**2.** $37.49 + 5.81	**3.** $8.50 + 6.29	**4.** $40.20 + 9.98	**5.** $12.53 + 48.76
6. 1.6 + 5.3	**7.** 5.9 + 8.3	**8.** 7.5 + 6.7	**9.** 6.17 + 4.0	**10.** 9.43 + 2.58

11. 14.02 + 3.55 **12.** 60 + 0.51 + 3.18 **13.** 27.6 + 19.3 + 41.208

14. 23.148 + 6.75	**15.** 50.42 + 0.681 + 3.7	**16.** 28.974 + 13.506 + 42.015	**17.** 4.0 + 62.018 + 45.79
18. 3.4 + 0.9 + 1.2 + 5.6	**19.** 8.03 + 42.5 + 16.97 + 2.18	**20.** 23.17 + 4.09 + 60.34 + 58.26	**21.** 0.39 + 62.05 + 14.87 + 3.54

Subtraction

Subtract.

1. 7.1 − 4.0	**2.** 5.7 − 2.9	**3.** 8.0 − 3.4	**4.** 8.2 − 3.9	**5.** 4.3 − 1.7
6. 72.46 − 11.05	**7.** 37.64 − 18.95	**8.** 43.1 − 19.62	**9.** 50.01 − 29.43	**10.** 54.81 − 46.92
11. 8.153 − 4.296	**12.** 5.463 − 1.785	**13.** 9.608 − 4.519	**14.** 9.0 − 2.487	**15.** 5.2 − 1.843
16. 0.358 − 0.109	**17.** 0.063 − 0.057	**18.** 0.004 − 0.001	**19.** 0.506 − 0.029	**20.** 0.01 − 0.007

Multiplication

Multiply.

1. 47×0.5	**2.** 125×0.2	**3.** 850×0.3	**4.** 27×0.15	**5.** 35×0.25
6. 325×0.33	**7.** 0.7×8	**8.** 0.5×12	**9.** 0.38×4	**10.** 0.49×29
11. 3.7×6	**12.** 4.02×18	**13.** 0.2×0.9	**14.** 0.8×0.7	**15.** 3.5×0.8
16. 63.7×0.4	**17.** 19.5×3.8	**18.** 67.4×32.5	**19.** 0.6×7.2	**20.** 0.05×0.3
21. 0.16×0.2	**22.** 0.38×4.9	**23.** 0.19×6.3	**24.** 4.92×7.5	**25.** 73.42×5.8

Division

Divide.

1. $6\overline{)7.2}$	**2.** $4\overline{)0.32}$	**3.** $2\overline{)0.258}$	**4.** $3\overline{)0.906}$
5. $5\overline{)6.9}$	**6.** $4\overline{)2.1}$	**7.** $25\overline{)15.2}$	**8.** $10\overline{)56}$
9. $0.3\overline{)9}$	**10.** $0.2\overline{)0.6}$	**11.** $0.5\overline{)35}$	**12.** $0.7\overline{)0.021}$
13. $3.1\overline{)89.9}$	**14.** $2.7\overline{)1.08}$	**15.** $3.6\overline{)0.18}$	**16.** $7.5\overline{)0.6}$
17. $0.05\overline{)0.265}$	**18.** $0.12\overline{)15.6}$	**19.** $1.25\overline{)2.5}$	**20.** $1.86\overline{)55.8}$

Divide. Round the quotient to the nearest hundredth.

21. $7\overline{)1}$	**22.** $0.3\overline{)14}$	**23.** $1.5\overline{)0.35}$	**24.** $0.36\overline{)6.1}$

Word Problems

Solve.

1. In the 1980-81 crop year, Canada exported the following number of million tonnes of grain: West Coast ports, 9.564; Churchill, 0.289; Thunder Bay, 10.465; Atlantic ports, 0.73. How many million tonnes of grain did Canada export in 1980-81?

2. Let $a = 1$, $b = 2$, $c = 3$, $d = 4$, and so on. Find the sum of the letters in the word "examination".

3. An airline advertised a special return fare of $357.50 from Edmonton to Montreal. The regular fare is $577.50. How much will 2 adults save by taking advantage of the cheaper fare?

4. A trust company paid 19¾ % interest on a one-year deposit of $5000.00. What was the amount of interest paid for the year?

5. In the North American Soccer League, the Vancouver Whitecaps had 168 points after 30 games. What was the average number of points per game?

6. Grain exports through the port of Churchill were 0.523 million tonnes in 1979-80 and 0.289 million tonnes in 1980-81. How many more million tonnes were shipped in 1979-80 than in 1980-81?

7. The Toronto Stock Exchange Index closed at 2334.33 points on Thursday and 2310.61 points on Friday. How many points down from Thursday was the Friday index?

8. An airplane leaves Calgary at 13:05 and arrives in Toronto at 18:30. There is a 2 h time difference between Calgary and Toronto. How long is the flight?

9. A 24-can case of juice costs $10.08. The juice regularly sells at 2 cans for $0.89. How much money is saved by buying the case?

10. A group of students collected pennies for their favourite charity. The first day they collected 3 pennies. Each day they collected 3 times as many as the day before.
    a. How many pennies did they collect on the fifth day?
    b. How much money did they collect in all five days?

11. The Nile river is 6632 km long. The St. Lawrence river is 3440 km long. How much longer than the St. Lawrence is the Nile?

12. An elevator in a Paris apartment building was installed in 1883. How long has the elevator been in operation?

13. The price of a tire for the Langleys' car was $53.45. How much would a set of 4 tires cost?

14. A student whose mass is 32 kg on Earth would have a mass of approximately 896 kg on the Sun. How many times more is that?

15. The area of Prince Edward Island is approximately 5657 km^2. The area of Newfoundland is about 71.5 times that of Prince Edward Island. What is the approximate area of Newfoundland?

16. A pair of ice skates was advertised at 20% off the regular price. The regular price was $31.95.
    a. What is the amount the skates have been reduced?
    b. What is the sale price of the skates?

17. A city newspaper costs $0.25 a day on Monday through Thursday and $0.50 a day on Friday and Saturday. How much does the paper cost for four weeks?

18. In its first 5 softball games, the school team scored 9, 5, 12, 3, and 6 runs. The team won 4 games and lost only 1. What was the average number of runs scored per game?

19. The Grade Six class of King Richard School collected 1148 bottle tops for an art project. There were 28 students in the class. How many bottle tops did each student have?

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